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Reşat Aktan

Change in Tax Depreciation Policy and Public Regulation of Business
Dwight S. Brothers

Resource Use in Thailand
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Amos H. Hawley and *Otis Dudley Duncan*

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Mechanization of Agriculture in Turkey

By REŞAT AKTAN*

RELATIONS between man and capital have always been of great concern to economists as well as to politicians and administrators. Mechanization of farming in an underdeveloped country affects the whole economic and social structure. It changes, in general, a primitive and self-sufficient production into a complex, more specialized and commercialized agriculture which depends less on human labor and natural resources and has many advantages but also creates many and varied problems.

During the last six or seven years Turkish agriculture has undergone rapid and large-scale mechanization. This experience provides a case study of possibilities and limitations in the use of farm machinery as well as of the nature and extent of problems created thereby. The present paper deals with technical and economic aspects of agricultural mechanization in Turkey at the farm level. The findings of a survey which was recently undertaken by the University of Ankara[1] have been drawn upon heavily in the preparation of this article.

Situated between Europe and Asia, Turkey consists of two major sections: Asiatic Turkey, the Anadolu Peninsula which is also called Asia Minor, and European Turkey or Eastern Thrace. Anadolu is mainly a great plateau averaging about three thousand feet above sea level. The plateau sinks down in all directions except in the east to a region of wooded foothills; in the east it rises higher and changes into a mountainous country. Eastern Thrace is a continuation of the foothill country with rolling plains. The topography of Turkey is rather rough and mountainous in most regions, with steppes in the center and coastal plains, especially in the west and south. In 1954, 24.5% of the total land area was in field crop production; 2.2% in orchards, vineyards and vegetable gardens; 42.6% in pastures,

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The author is greatly indebted to Dr. George E. Brandow of Pennsylvania State University and Dr. Albert G. Black of Food and Agriculture Organization for helpful suggestions and editorial assistance in the preparation of this article.

[1] Faculty of Political Sciences, University of Ankara *Economic and Social Aspects of Farm Mechanization in Turkey*, 1953. The study was based on interviews with 3015 farmers and with 450 village heads in the most mechanized villages in all parts of Turkey except the East, but this area included about one-seventh of all the tractors in the country at the time (1952). The study describes changes since pre-mechanization days in animal power, kinds and amounts of crops, land tenure, farmers' debts and investments, migration to and from villages, and the like.

meadows and grassland; 13.4% in forests; and 17.3% in lakes, marshes and unproductive land.

Agriculture has always been, and still is, the mainstay of the Turkish economy. About three quarters of the population live in the rural areas, and a considerable portion of the national income—47-53% in the recent years—is derived from agriculture. The agricultural products make up four-fifths or more of Turkey's total exports, and supply more than half of the native industry's raw materials.

One of the chief characteristics of Turkish agriculture has been its relative self-sufficiency. The low rainfall, especially in summer, and the cold, long winters favor winter grain production in most parts of the country. However, coastal regions have a humid and mild climate and produce a variety of crops including sub-tropical ones such as citrus, tea and bananas. The production of cereals, principally wheat, dominates most of central, eastern and southeastern Anadolu and Thrace, but is locally supplemented by horticulture, industrial crops and livestock raising.

Livestock constitutes the second most important branch of Turkish agriculture. There are over sixty million head of livestock in the country, near half of them sheep. Cattle and buffalo are raised for work purposes as well as for meat or milk. They are generally concentrated in the grain farming areas, their density increasing toward Eastern Anadolu.

Among the industrial crops cotton, tobacco, potatoes and sugarbeets are most important. They are strictly cash crops for the peasants, and the first two, together with wheat and barley in recent years, are the highest revenue-yielding export crops. Industrial crops are mainly concentrated along the Western and Southern valleys and shores. Turkey also is famous for her specialty crops such as seedless raisins, figs, hazelnuts and pistachios.

The structure of the rural areas in Turkey is different from that of the United States and some European countries. Peasant farmers live in villages which are surrounded by fields and grazing land. Although the fields are privately owned, the grazing land is owned and used in common by the villagers. Almost all of the forests belong to and are operated by the state.

There is no accurate information about the land tenure patterns of the country. According to the inconclusive information at hand, there are near two and a half million farms in Turkey, 97% of which are family-type farms of 50 hectares (125 acres) or less each. The average size of family farms varies from region to region depending on the type of agriculture, density of population, and other factors. The overall average size is 6 hectares (15 acres). In the grain-producing regions where dry-farming methods are practiced and in the cotton-producing areas of Mediterranean and Aegean regions farms are rather larger, whereas in the more humid sections of the country, especially on the Black Sea shores they are smaller in size. A little over two percent of all the farms in Turkey are of medium size, that is, between 50 to 500 hectares (125 and 1250 acres) each. These medium-size farms are scattered all over Turkey but they are found especially in the regions of South, West and Central Anadolu. The number of large farms is very small, consisting of less than one percent of all the farms. Their average size is about 1,500 hectares (3,500 acres) and they are found mostly in the South and West.

Not only are a great majority of the farms in Turkey small in size but also they are usually divided into several fields which are scattered around the

village. It is not uncommon for a small farmer to operate five to ten or even more tracts of land of a few decares each. These pieces may be located within the limits of one or several villages with some distances up to several kilometers between them.

Most of the farmers in Turkey own and operate their own lands. However, about 8-10% of all farmers own no land at all and work as wage laborers or as sharecroppers or tenants. Probably more than half of all farmers own an insufficient amount of land to use their family labor economically and to produce enough for their own living. Some of these farmers, however, rent land, sometimes for cash but often on share basis, or they work in their slack seasons in agricultural or non-agricultural jobs to earn a little more income to support their families. Large landholdings which are found principally in the Southeastern provinces are operated in small tracts by sharecroppers and sometimes by tenants.

The acreage and production of major crops in Turkey show a generally upward trend but with periodical down movements since the mid-twenties. However, the biggest increase has occurred since 1948. The total area of major field crops in 1954 amounted to 12.7 million hectares (31.5 million acres) whereas the 1946-50 average was 9.1 million hectares (22.5 million acres.) This is an increase of more than 40%. Not only the acreage but also the yields per hectare increased greatly during this period except in 1954. The biggest production increases occurred in cereals other than corn, and in potatoes, sugarbeets, cotton and some legume crops.

The area and production of fruits and vegetables did not show important changes although data on vegetables are very scanty. Pasture lands decreased because some were plowed for crop production. Livestock numbers changed little, although sheep and ordinary goats increased somewhat.

Among the most important causes of the expansion of Turkey's agriculture were: general increase in prices; government support prices for certain products; more market outlets through better transportation and other means; increased governmental credit for farmers; good weather conditions which affected both acreages and yields; increased use of fertilizer and improved seed; more irrigation and drainage works; government land distributions to landless farmers; research and extension work of the Ministry of Agriculture; and some other less important causes. There are two more factors which are important and ought to be mentioned in this respect. One of these is government's favorable attitude toward agriculture and farmers and the other is mechanization of agricultural production.

As it was in the first few years of the Republic and also during the emergency years of World War II, so in recent years the problems of agriculture have again become prominent in the government's policies. Although other sectors of economy are not neglected, more emphasis is now put on the development of the country's agricultural resources. In addition to having the advantage of price supports, credits and other governmental programs which aim at encouraging agricultural production, the farmers in Turkey are exempt from national income tax which has been in operation since 1950. During the same period farmers also benefited somewhat from the reduction of livestock taxes and abolition of the per capita road tax. In general, more government expenditures are being made towards the improvement of the farmer's lot than formerly.

One of the most serious handicaps of Turkish agriculture has always been the very primitive tools and implements and empirical methods available to the farmers. The principal farm tool has been the old fashioned wooden plow, usually drawn by two meager oxen and rarely by horses. The use of the steel plow has increased recently but there are not many available yet. Seeding of cereal crops is ordinarily done by hand; very few grain drills are in use. Drill planting is more common in sugarbeet and cotton farming. Small grains are harvested by sickles and scythes and threshed by a wooden sled equipped with sharp flints underneath. In raising of other crops and livestock the most primitive tools are used.

There were in the past one or two governmental attempts to introduce modern machinery to Turkish agriculture. The first of these efforts took place in the middle twenties when farmers were encouraged to purchase tractors and other machinery. The second effort started just prior to World War II and took the form of establishing state machinery stations which were supposed to cultivate vacant lands, and at the same time, to do custom work for the neighbouring farmers so that they might become familiar with modern machinery. Neither of these efforts, however, were successful and by 1948 there was only a small amount of farm machinery of a modern type in farmers' hands.

From 1948 on, Turkish agriculture attempted another trial in mechanization. This time economic and social as well as political conditions were more favorable so that within five or six years great progress has been made. Each year during this period thousands of tractors and tractor drawn equipment, hundreds of combine harvesters, trailers, motorpumps and other machinery were imported, first from the United States of America, and later from European countries. This machinery was purchased by farmers under liberal credit terms and began to be used in many regions of the country. Table I gives the numbers of important farm machinery in use in three different years.

TABLE I—TOTAL FARM MACHINERY IN TURKEY, BY TYPE, FOR THREE DIFFERENT YEARS: 1948, 1952, 1954

Machines	1948	1952	1954
Tractors	1,756	31,415	37,740
Plows (tractor drawn)	1,472	30,766	38,000
Disc harrows (tractor drawn)	680	9,623	14,097
Cultivators (tractor drawn)	401	4,028	5,075
Graindrills (tractor drawn)	162	4,406	6,870
Cotton planters	2,570	13,909	....
Reapers	14,384	21,122	19,782
Binders	335	911	1,650
Combines	268	3,222	4,705
Threshers	430	959	1,220
Hay mowers	612	1,553	3,159
Trailers	140	12,982	18,088
Jeeps	....	650	957
Trucks	....	1,178	1,300

Mechanization was started first in Cukurova in the South and in the Aegean region where farms are relatively larger and farming more commercialized. At the same time, the economic status as well as the receptivity of the farmers in these two regions towards new methods was relatively more favorable. They grow cotton and other industrial crops extensively, which are valuable cash crops and well suited to mechanization. Then grain farmers of the Central Plateau, Southeast Anadolu, and Thrace, and mixed farms of Mediterranean coasts and border regions adopted machines. The eastern provinces, where topography is not suitable to machine farming and the Black Sea provinces in the North where land holdings are generally small and rough, started to mechanize last and benefited the least. Out of the 66 provvinces of Turkey two have no tractors, combines, or other machinery of the larger types, and a number of the prov-

vinces have very few of these machines. On the other hand, more than two fifths of all tractors and other larger machines are concentrated in half a dozen provinces. Machines are used most extensively in cotton farming; but with wheat and barley production in second place. Agricultural machines are used but to a lesser extent for sugarbeets, other cereals such as rye, oats, and maize, and for some commercial crops such as tobacco, potatoes, and sunflowers.

Potential Benefits from Mechanization

For a long time there has been a shortage of draft power, animal and mechanical in Turkish agriculture in relation to cultivable lands and farm labor available for production. The use of oxen for opening up pastures, clearing brush land and the like has not been efficient or satisfactory. This fact provides one of the important causes of mechanization and partly explains the recent expansion of agriculture in Turkey. Mechanical power has given the farmer the possibility of increasing his crop land and enlarging his farm operation, especially in the areas where additional land was available. The farm mechanization study referred to above shows that farmers added on the average 31% to their farms within the last few years, and that the maximum increase in area was 43% in Southeast Anadolu.

High capacity agricultural machines such as tractors, combines, and the like help farm work to be done at the proper time. This is especially important for grain farmers who generally have a limited period of time for their plowing and seeding. With wooden plows and oxen the farmer could not prepare the soil for fallow in time and till it as frequently as necessary. Because winter grains generally yield higher than spring grains and because they also are less risky, the farmer usually prefers them to spring planting. However, to have these benefits they should not be seeded in most parts of the cereal regions later than October. Seeding grains can be done only when it rains and the soil softens. Fall rains are undependable and the farmer may be forced to seed his fields unduly late or to defer it until spring. Even if fall rains come in proper time it may give the farmer only a very short period of time to finish his plowing and seeding. During the spring the situation is more or less the same, and suitable conditions for planting grains as well as cotton and sugar beets may last only for a few days.

Under these circumstances tractors and other machinery prove very useful in accomplishing farm work at proper times. These and other implements also perform a better job and help the farmer perform farm operations in more advantageous ways. Both timeliness of operations and better performance by the use of machinery bring higher yields in various crops. In addition to this, using drills in planting small grains makes possible a saving of at least 25% in seed. Drills help in more efficient use of chemical fertilizers.

Mechanical harvesting and threshing reduces losses by perhaps fifty percent and adds to the yields. The combined effects of various machinery amount to 30-35% increase in yields of four major crops; namely, wheat, barley, cotton and sugarbeets, as shown by the farm mechanization survey. This may mean even greater quantities and higher values as mechanization proceeds.

One of the most important contributions of agricultural machines in more advanced countries, such as the United States of America, has been saving in feed for work stock. However, the experience in Turkey up to the present time shows insignificant amounts of feed saving because, first, mechanized farmers do not

get rid of their work animals as fast and as completely as they should; and second, the work stock is fed mostly straw during a larger part of the year and other feed is not usually produced on the same farm. Thus, by using mechanical power the requirements for livestock feed have not greatly diminished and significant amounts of land and other resources are not released for production of other crops. According to the study, the mechanized farmers reduced, on the average, the number of oxen by 70%, the buffalo by 55% and horses by 50%.

As has been the experience in other countries, mechanization of agriculture in Turkey reduces labor costs somewhat. However, the potential saving is much less than it is in countries such as the United States because there has been a surplus of family labor on the average Turkish farm. Since agricultural wage rates are relatively low, probably10-15% of the United States level, labor cost savings on larger farms is also limited. The farm mechanization study showed that large operators, since they have been using machinery, had cut down by 6% the number of their year-round hired workers but on the other hand they increased the number of temporarily hired laborers materially because they have enlarged their operations and because they have been using land resources more extensively and efficiently. Unfortunately, there are no data available to indicate the amount of saving in labor costs due to mechanization.

Maintenance and Operation of Machines

Farm mechanization in Turkey started practically from scratch and has gone forward rapidly. One of the important problems has been providing skilled operators for the machines. There were at the beginning very few farm people who had formal training in the operation and maintenance of agricultural machinery. Some young villagers had learned something about motor vehicles while in the Army but their number was too limited and their knowledge not very complete. Also, graduates of technical and vocational schools who wanted to become machine operators were rare in the villages. Therefore, in many cases the farmer had to start using a rather complicated machine such as a tractor after one or two hours of instruction by a dealer's agent; but he really learned how to operate and maintain it by practice. In most cases the farmer himself or a member of his family, ordinarily a young man but sometimes a woman or an adolescent boy, operates the tractor. The farm mechanization survey shows that about three out of four of the more mechanized farmers operate their machinery themselves or have a member of the family do it. If smaller and less mechanized farmers also had been taken into consideration, this ratio would have been even larger. However, for the combine, which is a more complicated and delicate machine, farmers usually hire an operator. Professional operators although not always excellent or even very competent are hard to get, especially in the Southeast and Central Anadolu. According to the survey one out of three mechanized farmers in Central Anadolu and two out of three mechanized farmers in Southeast Anadolu reported difficulty in finding machine operators. On the average, one fourth of the farmers in all survey regions had complaints about finding operators. Most drivers are employed for a working season, and sometimes on a yearly basis and with oral contracts. Since permanent or at least long-time employment is not customary, labor turnover has been rather high, with an average rate of three, but sometimes

up to five or six. In many cases the farmer employs an operator only until he himself or some member of his family has learned to take over. Both hired and owner operators of machines, but especially the latter, often have insufficient knowledge about proper operation and maintenance of machinery. Therefore, machines are not always handled and taken care of well, kept in proper adjustment, or checked and greased on time for good maintenance and long life. Often there are breakdowns and resulting interruptions of work. The mechanization survey shows that on the average every third mechanized farmer complained of frequent breakdowns, and the average number of days during a year his machine was idle for this reason was 19 days per tractor.

Skilled mechanics are even scarcer than machine operators in Turkey. They are also relatively less competent in performing their job. About half of the sample farmers of the survey complained of inability to find repairmen. Repair facilities also are insufficient in number and equipment. They are usually located in county and province seats rather than in villages, with the result that four-fifths of the mechanized farmers had to leave their own village to get their machines repaired. The conditions are even more difficult in the less-developed Southeastern and Central provinces.

In the whole farm mechanization movement the bitterest complaint has been raised about shortage of spare parts. Two thirds of the sample farmers of the survey reported difficulty in finding spare parts and told of outrageous black market prices they were forced to pay. The machinery dealers usually do not carry a large enough stock of spare parts and often the farmer must hunt for them in the larger cities. In the outlying regions, especially in the Southeast Anadolu, the problem is most severe. During the work season it is not uncommon for a farmer to send for a part by airplane from Istanbul or even from European countries, or to go and get it from a distant large city. Under these conditions repair bills are unduly high for fairly new machinery and at the same time the machines stay idle for days and work is not done on time. According to the survey, yearly repair bills of mechanized farmers run as high as 1,550 Turkish liras (about $550) with an average of 665 lira (about $240) per tractor. The present rate of exchange of the American dollar is 2.8 Turkish lira.

One basic factor which complicates repair and spare parts problems as well as operation of the machines is the excessive number of makes and types of machines imported to Turkey. As an example we cite the figure compiled by the Ministry of Agriculture for tractors. There are 63 makes and 165 types of tractors in use in the country. However, it is maintained by the specialists in the Ministry that ten major makes include about three fourths of all tractors in Turkey, and some makes are represented by fewer than one hundred, even as few as 20, tractors. Since the different makes and types are not exclusively concentrated in various regions of the country the job of operators and mechanics, as well as that of maintaining stocks of spare parts become extremely difficult. This problem is gaining importance as time passes because some of the importing firms have stopped doing business and some of the machine types have already become obsolete. The situation is more or less the same for the other machinery although it is not so acute.

About half of all the tractors in Turkey use kerosene as fuel and two-fifths of them

diesel oil. The remainder either use gasoline or a combination of fuels. Turkey imports almost all the motor fuels used in agricultural and non-agricultural motors. When the oil deposits which were recently discovered in the Southeastern Anadolu are exploited fully it is possible that part or all of the need may be supplied by domestic production. Imported fuels and oils are rather expensive (for example, a gallon of kerosene or diesel oil would cost 50-60 American cents in different parts of the country) partly because import duties and other taxes on them are high. Fuel used for agricultural purposes is exempt from municipal sales tax, which amounts to 2-3 kurus per liter. High fuel prices make operation of agricultural machinery rather expensive and raise some doubts about the profitability of the use of machinery should the prices of agricultural products decline in the future.

Fuels and oils are fairly well distributed to cities and towns but rarely to the villages. Since farmers often do not have large storage tanks or enough containers and frequently lack capital, few of them can have an adequate supply of fuel on hand at all times. The country dealers also do not carry large stocks in storage so that it is possible to have local shortages of fuel and oils during work seasons. The mechanization survey showed that 21 percent of the sample farmers had difficulty in finding fuel; and on the average for 15 days a year (33 days in the Black Sea region) their tractors remained idle on account of fuel shortage.

The majority of the farmers (according to the survey 88% of them) provided shelter for their machinery. However, the climate in most parts of Turkey is such that keeping the machines in the open, provided that they are properly greased and oiled, does not harm them materially.

The above discussion makes it clear that farm mechanization in Turkey presents many technical problems some of which are unknown to economically well developed countries. However, the government has some regulations and programs to help solve these problems. The first of these regulations applies to the importing firms which benefit from the Marshall Aid Program and/or government credit provided through the Agricultural Bank. These firms must be the sole agents in the country of the foreign manufacturers they represent. They must sign a guarantee that they are able to import yearly at least 100 tractors or 500,000 T. L. (about $175,000) worth of various machines, to establish and maintain sales agencies in at least three provinces, and to import and sell together with tractors such farming equipment as is found necessary and desirable by the Ministry of Agriculture. The kinds and types of machinery they intend to sell, especially tractors, are examined and tested in government sponsored university laboratories and only those which are found useful for the country's agriculture are allowed to be imported. The firms also guarantee to import necessary spare parts at the minimum of 5% of the value of their yearly imports, to keep sufficient stocks of spare parts in their agency, and to sell them at standard prices in the regions where they supply machinery. Importing firms are supposed to provide mobile and stationary repair facilities for farm service; their number varies with the amount of machinery imported. The firms also must have instruction books and guides translated into Turkish and printed for distribution to farmers who buy machinery. The importing firms are responsible for these duties to both the Ministry of Agriculture and to the Agricultural Bank. The Ministry and

the Bank may inspect the firms from time to time to see that they fulfill their responsibilities. The responsibilities may last three years beyond the date when a firm stops importing certain makes or types or terminates its operation completely. For this reason the importing firms must see that foreign manufacturers with whom they do business agree to these conditions and share the responsibility. The government also controls the sales price of the machinery imported under credit plans. The maximum price a dealer may charge in any part of Turkey for a piece of machinery may not exceed the c.i.f. import value plus 30% for costs and profits for Marshall Plan equipment and 35% for other equipment.

To solve problems of obtaining machine operators and mechanics, the vocational schools sponsored by the Ministries of Agriculture and Education are helping to train men. In addition, the Ministry of Agriculture arranges for short-term courses of instruction for younger people desiring to become mechanics or operators. These courses are usually held at the state farms or agricultural schools and may last for about three and a half months. The instruction here is free, and men attending are given room and board free of charge. During the last five years about seven thousand farm people were trained. All the training facilities and mechanics of the Ministries of Agriculture and Education located in various regions of the country help the farmers with their machine troubles. In addition, the district machinery experts of the Ministry of Agriculture make regular tours in the villages and inspect the conditions of the machinery, give advice to farmers, and help them with their problems. These machinery experts, about 40 in number in the last year, hold brief courses of one to three days in the villages for those who actually operate the machinery—in order to improve their knowledge and skill. During the year 1952 machinery experts of the Ministry of Agriculture made about ten thousand personal calls and gave courses for about four thousand farmers. These experts also inspect local machinery dealers to see that they comply with their promises. The Ministry also provides such aids as pamphlets, leaflets, wall charts, and provides instruction through radio. However, all these governmental measures and programs have not been completely successful in solving the problems for which they orginally were initiated.

Farm Organization and Related Matters

Since mechanization started there has been a tendency for larger farms which use machinery extensively to increase in size. According to the survey the average size of mechanized farms was about 840 decares (about 210 acres) in 1948, whereas it increased to 1113 decares (about 280 acres) in 1952. However, most of this increment was due to spread of the practice of renting land; the amount of land owned by these farms increased by only 45 decares (10 acres) each between the two years. Turkish villagers generally put great value on land and hold it very closely to their hearts. Thus the peasant is very reluctant to sell a piece of land he owns even if he is not cultivating it at that time, unless he is in great distress. Tractor owners could enlarge their operation by renting tracts of land which were formerly kept idle or leased to small sharecroppers. Since cash renting is a more suitable arrangement than sharecropping for large farmers, during the period of increasing mechanization the practice of cash rental of land has increased and sharecropping of small farmers has decreased.

Because of fragmentation of land holdings in various parts of Turkey, the use of machinery on even larger size farms is handicapped. An excessive amount of time is wasted in cultivating odd-shaped fields and in travelling between them; thus advantages to be gained by using farm machinery are reduced sharply. There is as yet no serious attempt to consolidate these fragmented holdings; and it seems that the pressure of population together with present inheritance law provisions tend to produce further fragmentation of land. However, introduction of large farm machinery must create a counter-pressure towards consolidation. The effects of the phenomenon, however, are not yet determined.

Another change resulting from use of machinery in agriculture apparently has been more commercialization and specialization of farming especially in the regions where industrial cash crops may be grown. Mechanized farmers try to specialize in best adapted crops and to produce more for the market. Sharp increases in cereals and cotton productions are partly the result of use of farm machines. Machinery also affected the proportion of field crops to livestock raising. Village grazing lands which are owned and used in common have been an important source of newly opened cropland. This movement has intensified an acute problem where grazing pressure on pasture land has always been in excess of its capacity. Another tendency observed since mechanization is that the proportion of croplands in fallow has been diminished in various regions because mechanized farmers are able to cultivate more land in the same year where there is enough moisture to do so whereas formerly they had to leave part of it in fallow on account of draft power shortage.

The large size of rural families and the social pattern in villages prevented some mechanized farmers from using labor force as economically as should be possible. They are rather slow in making necessary adjustments with regard to labor force and still seem to think of labor requirements in the old terms rather than the new. Machines are still novelties and it is possible to see the two or even three men who once would have been plowing with oxen now riding on the same tractor or combine. In addition, many farmers, in fact 30% of all mechanized ones, must hire operators and mechanics. These inefficiencies in using labor force are not unique for Turkey and will be overcome as time passes and the farmers, no doubt, will realize the full benefits of mechanization then.

Turkish farmers have not always invested in machinery strictly on economic bases, i.e. in accordance with potential economic returns the machinery may bring. Because farming has been a way of living rather than a business for so long a time some non-economic factors have frequently dominated the decision to purchase. Since the ownership of machinery gives community prestige just as does the possession of land, some farmers whose business does not actually justify a purchase do buy machines. Furthermore, because of liberal credit terms some farmers have purchased machinery which they would not have done otherwise. On the other hand, another group of farmers who did not have the knowledge of potential benefits of machinery and /or available credit facilities could not buy the machines for which they would have very profitable use.

Investment in Machinery

Investment per farmer in machinery varies from region to region as well as from farm to farm within a certain region.

According to the mechanization survey the average investment of 3015 farmers was 15,515 T.L. (about $5,540 at the present rate of exchange); the lowest regional average was 11,736 T.L. in Marmara and Thrace, and the highest 24,806 T.L. in Southeast Anadolu. The most common per farm investment was between six to nine thousand T.L., which represented cost of an average tractor and some simple equipment. In the Southeast region the investments were relatively larger—almost half of the sample farmers in this region had an investment of over 20,000 T.L. each. In the Black Sea region the most common investment amounted to 9-to 12,000 T.L. Investments above 24,000 T.L. were rare. The maximum per farm investment of 1,235,000 T.L. was found in the Mediterranean region and the second highest, 450,000 T.L., in the Aegean region. However, those who had investments of over 100,000 T.L. each were only 19 out of 3015. The composition of investments also varied somewhat among the regions and farms. On the average 74.6% of all investments in machinery was for tractors, 13.7% for combines, 5.2% for pumps, and the remaining 6.5% for all other machinery and equipment.

Most of the farmers, in fact 93% of all mechanized farmers according to the survey, borrowed money to purchase their machinery. Those who did not borrow at all were often small investors of below 5,000 T.L. each, or well-to-do people who could invest without contracting a debt. The total debts of sample farmers for machinery was nearly three-fifths of their total investment in machinery. The per family debt contracted for purchase of agricultural machines was 9,769 T.L. on the average; it rose to 17,744 T.L. in the Southeast and fell to 7,640 T.L. in the Aegean region. The principal source of credit to farmers for this purpose was the government-owned Agricultural Bank—95% of all borrowings were from this institution. If the farmer made a 20% down payment for his purchase, he could borrow the remaining 80% of the purchase value with the condition that he was to pay it back in four yearly installments. In many instances the farmer could arrange with the Bank for additional short-term production credit in order to be able to make the down payment, so that practically the whole investment could be made with borrowed money. Machinery credits have carried an interest rate of three percent and production credit an interest of 6% to 7%. However, as mechanization progressed the terms of credit tightened somewhat, although the interest rates did not change.

Ownership of Machines

Agricultural machines are generally owned individually or in partnership. Since family ties are relatively strong and real property of close relatives such as father and sons, brothers, husband and wife, cousins, etc. are not always separated for operation purposes, it is rather common to own some machines in partnership. Simple partnerships among two or more villagers for purchase and use of some more expensive machines also were found here and there. However, ownership of machinery by farmer cooperatives or by the village entities was seldom found with an exception of the Black Sea region where farms are very small. Since timeliness of operation is less important for the thresher than for most of the other machinery it was found to be most frequently owned cooperatively. Table II gives ownership situations of some important machines, according to the mechanization survey.

TABLE II—PERCENTAGE OF FARM MACHINES BY TYPES OF OWNERSHIP: 1952

Machines	Individual ownership	Partnership	Cooperative ownership	Village community ownership
Tractor...	86.6	12.6	0.5	0.3
Drill.....	92.2	7.2	0.3	0.3
Thresher .	86.4	8.7	3.7	1.2
Combine..	65.6	33.6	0.6	0.2
Pump	95.8	3.6	0.3	0.3
Truck.....	86.0	13.1	0.2	0.7

A practice among the mechanized farmers has been to do custom work with their machinery for other farmers. A tractor owner who is willing and has free time may occasionally plow or cultivate another villager's fields or do some other custom work for him. But some tractor owners who own or operate rather small farms in relation to traction power they have, or even some people who own and operate no farm at all, spend most of their time doing custom work for others. According to the mechanization survey about two-fifths of all tractor owning farmers in the sample were doing custom work for others. On the average, these farmers cultivated yearly over 400 decares (100 acres) of land which belonged to other farmers. There are also some farmers or non-farmers who own combines and do some custom work for other farmers. These custom workers receive their payment in cash or kind, and from the rates they charge it appears as though custom work is a profitable business—sometime more remunerative than and preferable to actual farming. Since it is difficult to justify some farmers' purchases of rather expensive and high-capacity machines such as tractors and combines for the area of land they operate, it seems a sound economic practice for such farmers to do custom work in order to utilize their machines and their own time. On the other hand, it is obvious that those farmers who have their work done by somebody else's machine ought to have a real economic reason for so doing and should not do it just for the sake of avoiding the drudgery of farming.

Some General Observations

Introduction of modern machinery into a primitive agriculture which uses almost exclusively backward production methods and implements is a difficult job and creates many problems. To be fully successful this movement must be supported with a complex program of activities: Farmers ought to be taught how to choose machines and how to use them on the farm. Whenever possible, members of machine-owning families ought to be trained in the operation and maintenance of equipment. Credit, often on more liberal terms than has been common in a capital-hungry country must be supplied to the farmers. Repair facilities and spare parts in locations readily accessible to farmers ought to be provided; fuel and oil should be distributed; transportation and marketing facilities for excess production should be provided, etc.

Since the job itself is a complex one and the process of changing old practices into new takes time and goes slowly, several years are required before full benefits are realized from mechanization. In the meantime, inefficiencies in the use of machines will be common and there will be many instances of machine idleness due to lack of a spare part or failure to make a simple adjustment.

Among the farmers there is a strong tendency to own their own machines and implements. Although partnership and custom work are rather common, cooperative ownership by several farmers is not practiced. The opportunity of the large farmer to mechanize is, of course, greater than the small farmer's. But suitable animal-drawn equipment can

gain for small farmers most of the increased yield to be obtained from mechanization, especially if horses and mules are substituted for oxen. The chief advantage of the large farmer over the small operator is in ways that do not affect yield: the saving of labor and the elimination of work animals. Usually these can be of little or no value to the small farmer. Where small operators cannot even buy relatively inexpensive implements they can still benefit from modern machinery by way of custom work.

Another observation is the rather prevalent practice of using tractors for nonagricultural purposes such as carrying goods or even persons from and to the village. Quite often farmers who own tractors fail to purchase necessary supplementary equipment.

It is doubtful that the mechanization of the Turkish agriculture will repeat the evolution which occurred in the economically more developed countries such as the United States of America—for example, from cradle to reaper to binder to combine. In general, the large farms will and should change directly from the primitive to the most modern methods despite the difficulties encountered. Meanwhile, small farms will continue with primitive methods, perhaps substituting particularly advantageous simple implements for the old. For a long time, both primitive and modern methods will be important; the intermediate stages will be represented but seldom dominant.

The California Court Reference Procedure—Economics and Law in the Allocation of Ground Water†

By J. HERBERT SNYDER*

THE RAYMOND BASIN and West Coast Basin areas of Los Angeles County in southern California provide aggregative study situations in which a legal process—the Court Reference Procedure—has been used to allocate relatively scarce ground-water resources among the wants and needs that can be satisfied by its use. Only small segments of the over-all problem can be presented in this paper, which is a preliminary report on one phase of research in ground water in California.[1] The central problem is one of scarcity of the natural resource ground-water. The report reviews certain aspects of the Court Reference Procedure that are of interest to both students of law and economics.

Use of Ground Water. Earliest known use of the Raymond Basin area water was at the San Gabriel Mission in 1771.[2] But it was not until after the beginning of the major influx of settlers in southern California in the 1870's and the 1880's that greater development of water supplies became necessary. Urban uses began to replace agricultural land uses before the turn of the century. The role of agriculture in ground-water use within the Raymond Basin area has always been relatively unimportant, and has by now (1957) practically disappeared. This is somewhat in contrast to the West Coast Basin area in which agricultural land and water use has dominated until recent years. Only after World War II has agricultural water use become relatively unimportant. Development of a local water supply dependent upon ground water dates back to the 1870's and arose from the lack of adequate surface water supplies. Expansion of irrigation acreage together with pressure decreases in the artisian areas resulted in greater dependence on pumped water.

Location of Extraction. The location of ground-water extractions within a ground-water basin may have important implications. In the Raymond Basin area the major points of extraction were located near subsurface barriers to ground-water movement. Extractions within a mile of such barriers have varied from a low of about 65% to a high of about 94% of the total ground-water extractions in the Raymond Basin area. These locations have continued to be the most favorable of the area in that declines in water level have been less and costs of extraction have been lower because of a smaller total pumping lift.

Salt Water Intrusion. In the West Coast Basin area, however, the best original well locations have not always withstood the test of time. Degradation of ground-water quality has occurred

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[1] The final report will be issued as one of the Giannini Foundation Ground-Water Studies. Earlier studies published are: Patricia McBride Bartz, *Ground Water in California: The Present State of Our Knowledge*, Giannini Foundation Ground-Water Studies No. 1, University of California College of Agriculture, February 1950, 2nd Ed.; J. Herbert Snyder, *Ground Water in California: The Experience of Antelope Valley*, Giannini Foundation Ground-Water Studies No. 2, University of California, College of Agriculture, February 1955.

[2] California Department of Public Works, Division of Water Resources, *Report of Referee* (In the Superior Court of the State of California in and for the County of Los Angeles), *City of Pasadena*, v. *City of Alhambra, et al. No. Pasadena C-1323*, July 1943. Hereinafter cited as: *Report of Referee* (Raymond Basin Reference).

and wells have been abandoned.[3] The concentration of ground-water extractions in the area facing San Pedro Bay has reversed the land-to-sea-pressure gradient permitting intrusion.[4] It is difficult to appraise the extent of sea-water intrusion in the West Coast Basin area because it is not characterized by a uniform well-defined frontal advance. It is known, however, that the strip of land overlying intruded sea water varies from one-half to over two miles in width.[5]

Sea-water intrusion has two major impacts on the ground-water economy of an area: First, individual water users are subjected to gradually increasing problems of degraded water quality. This may arise through locating a particular well so close to sea water that pumping reduces the hydraulic gradient permitting sea-water intrusion; or extractions may be so concentrated that reduced gradients in the central area cause inflow of sea water at the ocean margins. In either event the individual located near a body of ocean water will suffer from degraded water quality. Abandonment of the well must result if intrusion is severe and resort made to another source of water.

Second, sea-water intrusion destroys ground-water storage for an area as a whole. Once the critical zone of the ground-water storage resource has been exceeded (in terms of water quality) restoration of the resource may be physically as well as economically impossible.[6] Water spreading at appropriate recharge points, if known, and restricted pumping combined with importation of supplemental water may offer a physical solution and restoration of the resource—but it may not be economic.[7] Accurate measures of the extent of sea-water intrusion would make more meaningful estimates identifying the critical zone and the economic feasibility of restoring the ground-water storage resource to some desired physical (or economic) condition.

Overdraft. Overdraft it a term frequently used to encompass the ground-water problems of an area. Overdraft is the volume of ground water removed in excess of recharge from aquifers within a particular geographic area and for a specified period of time. The differentiation of types of overdraft as an analytical tool in the investigation of ground-water problems has been presented elsewhere.[8]

The Raymond and West Coast basins are characterized by long-run or secular overdrafts. Long-run overdraft is a result of "mining" the ground-water stock resource. Draft on the resource has so exceeded recharge that even in periods of heavy rainfall and stream runoff cumulative draft exceeds cumulative recharge.

Safe Yield. The physical concept of safe yield is frequently used to quantify overdraft. The referee has defined safe yield in the Raymond Basin area as "the average annual amount of ground water that could be artificially extracted from the basin over an indefinitely long period of years . . . . without causing a net

[3] California Department of Public Works, Division of Water Resources, *Report of Referee* (In the Superior Court of the State of California in and for the County of Los Angeles), *California Water Service Company, et al.* v. *City of Compton, et al., California Water Service Company, et al.*, v. *Alexander Abercromby, et al., No. 506806*, June 27, 1952. Hereinafter cited as: *Report of Referee* (West Coast Basin Reference). The earliest recorded date of abandonment of a well in this area as a result of degraded quality was at Redondo in 1912, p. 26.

[4] In 1949-50 the Referee reports that draft in this area amounted to one-quarter of the total for the West Coast Basin Area. *Report of Referee* (West Coast Basin Reference), *op. cit.*, p. 102.

[5] *Ibid.*, p. 25.

[6] S. V. Ciriacy-Wantrup, *Resource Conservation: Economics and Policies* (Berkeley: University of California Press, 1952), pp. 38-40.

[7] Because of the absence of recharge areas in the West Coast Basin area, corrective action would be limited primarily to restrictive pumping and importation of supplemental water.

[8] J. Herbert Snyder, *Ground Water in California: The Experience of Antelope Valley*, *op. cit.*, pp. 81-97.

lowering of water levels during the period."[9]

The physical situation in the West Coast Basin, however, does not lend itself to such precise evaluation. Safe yield cannot be defined in terms of changes in storage—in the confined aquifers of this area there has been no change in storage. In ground-water basins such as the Raymond Basin where a free water table exists there is useable ground-water storage capacity. In the West Coast Basin there is no useable storage capacity: "The sole criterion that governs the amount of water which may be safely withdrawn or diverted annually from the West Coast Basin is that water levels in the basin must be maintained sufficiently above sea level to prevent sea-water intrusion."[10] A *definite* annual volume of water that might safely be diverted from the West Coast Basin was not specified. In view of the estimates of annual fresh water recharge underflow, however, the referee suggested that average annual extractions in the area be limited to a total of 30,000 acre feet per year.

Accurate quantitative definition of overdraft in the West Coast Basin was not possible for the same reason that safe yield could not be specified. Only a qualitative observation—but a most significant one—could be offered: Because the referee's analysis (1932-1950 base period) showed that total annual production of ground water has exceeded the annual replenishment of fresh water to the basin in each year of that period, "there has been an overdraft on the basin since at least the years 1932-1933 period."[11] This is another example of long-run overdraft.

Thus, overdraft may be estimated for either free water table ground-water basins or for confined ground-water basins. The estimates are more accurate for free water table basins, however. Estimates of safe yield and overdraft can be made with reasonable accuracy for areas similar to Raymond Basin. For areas such as the West Coast Basin estimates of safe yield and overdraft must rest on heroic assumptions or be confined to qualitative observation. Location, degree of concentration of pumping units, as well as volume of extraction act so as to determine the extent of sea-water intrusion. Protection of ground-water quality in the basin fronting the ocean depends on prevention of sea-water intrusion—yet subsurface inflow depends in part upon lowered hydraulic gradient. If conditions are such that the pressure surface can be reduced to stimulate replenishment but not enough to drop below sea level then water quality can be maintained. The referee's recommended volume of extraction is aimed at creating this condition.

The Legal Setting of the California Court Reference Procedure

The Court Reference Procedure as applied to ground-water adjudications has evolved from a water law setting characterized and determined by court decisions more than by statutory provisions. The first legislation affecting the acquisition of water rights is to be found in the state legislation authorizing the appropriation of water enacted in 1872.[12] The first legislative provision affecting the adjudication of water rights is found in the state legislation creating the water

[9] California Department of Public Works, The State Engineer, *Draft of Report of Referee on a Review of the Determination of the Safe Yield of The Raymond Basin Area, Los Angeles County, California* (In the Superior Court of the State of California in and for the County of Los Angeles), *Pasadena* v. *Alhambra, et al., No. Pasadena C-1323,* May 1954. Hereinafter cited as: *Report of Referee* (Review of Determination).

[10] *Report of Referee* (West Coast Basin Reference), *op. cit.*, p. 126.

[11] *Ibid.*, pp. 126-127.

[12] Sections 1410-1422, *California Civil Code.*

commission act of 1913,[13] which was delayed by referendum and did not go into effect until December 19, 1914.[14] Until 1914 court action alone provided for the adjudication of water rights. The courts in arriving at their decision relied heavily upon the then currently accepted doctrines relating to the use of water. During this time and subsequent to the legislative provisions for the adjudication of water rights some of these doctrines have undergone modification.[15]

An important element in the decisions of the Raymond Basin court reference was the earlier established principle that rights to the use of percolating ground water may be acquired by adverse use—prescription—as against the rights of overlying land owners.[16] In all instances, however, it has been consistently recognized that the court may regulate and apportion use of percolating ground water in accord with relative rights.[17] Thus, the courts have the power to adopt and enforce a physical solution even if the parties cannot agree upon one.[18]

The Court Reference Procedure is one of two statutory procedures for determining water rights in California, the other being entitled in the Water Code, "Statutory Adjudications." Both procedures have a common origin in California law in the Water Commission Act of 1913 which laid the statutory ground work for the determination of relative water rights of various claimants.[19] Emphasis in this discussion, however, is given to the Court Reference Procedure.

The Statutory Adjudication Procedure. The Terms of the Water Commission Act of 1913 permitted statutory adjudication of water rights, excluding percolating ground water[20] either upon the initiative of the water commission or upon petition of one or more claimants to the use of water from a particular source. The procedure outlined for the adjudication of water rights in the 1913 act was not sufficiently precise and proved to be unsatisfactory.[21] The procedure was revised and clarified by amendment to the Water Commission Act in 1917.[22] This amendment was patterned after the Oregon procedure for adjudicating water rights.[23]

The next noticeable change in the statutory adjudication procedure was the elimination of the provision that the State Water Commission (now State Water Rights board) might undertake water rights adjudication procedures on its own initiative. This was done by legislative amendment in 1935.[24] This provision was dropped only to delete an obsolete portion of the law—no essential change in legal effect was made. The amendment specifically stated that "no language in this act shall be . . . . a

[13] Chapter 586, *Statutes and Amendments to the Codes, California, 1913,* (Sacramento: California State Printing Office, 1913), pp. 1012-1033.

[14] A. E. Chandler, *Elements of Western Water Law,* Revised Edition (San Francisco, California: Technical Publishing Company, 1918), p. 73.

[15] For a thorough treatment of this subject, see: Wells A. Hutchins, *The California Law of Water Rights* (Sacramento: State of California, Printing Division, 1956).

[16] *Hudson* v. *Daly,* 156 Calif. 617, 105 Pac. 748, and *Burr* v. *Maclay Rancho Water Company,* 160 Calif. 268, 116 Pac. 715.

[17] *Tulare Irrigation District* v. *Lindsay-Strathmore Irrigation District,* 3 Calif. (2d) 489, 45 Pac. (2d) 972.

[18] *Lodi* v. *East Bay Municipal Utility District,* 7 Calif. (2d) 316, 60 Pac. (2d) 439.

[19] Chapter 586, *Statutes and Amendments to the Codes, California, 1913, op. cit.*

[20] *Ibid.,* Section 42 of this act specified that the act applies to "surface water and subterranean streams flowing in known and definite channels."

[21] A. E. Chandler, *Elements of Western Water Law, op. cit.,* p. 73.

[22] Chapter 153, *Statutes and Amendments to the Codes, California, 1917,* (Sacramento: California State Printing Office, 1917), pp. 231-239.

[23] A. E. Chandler, *op. cit.,* p. 73. See also Section 539.020 *Oregon Revised Statutes, 1953.* This section provides for petition to the State Engineer by one or more claimants to water, requesting determination of the relative rights of the various claimants to the waters of the stream. This section originated as Section 11, Chapter 216, *General Laws of Oregon, 1909.* Contained in the Report of the 25th Regular Session of the Legislative Assembly of Oregon, 1909.

[24] Chapter 647, *Statutes and Amendments to the Codes, California, 1935* (Sacramento: California State Printing Office, 1935), p. 1795.

limitation or restriction upon the power or duty of the said water commission to determine . . . all rights to water or the use of water . . . ."[25] This portion of the 1935 legislation was designed to accomplish two objectives, the first being to eliminate authority to initiate adjudications. It was conceived that such power was so broad that it was resented by the public affected and, as is noted below, from the administrative standpoint, it was unnecessary. The second objective was to supply an adequate statutory standard to guide exercise of discretion in acting on petitions for adjudications. It was considered that the previously existing language, that the facts and conditions "justify" the adjudication, might be held an inadequate legal standard in court tests. In 1935 this language was changed to read whether "the facts and conditions are such that the public interest and necessity will be served by determination of the rights to the water involved."

Applications to appropriate water must be approved by the Division of Water Resources (now State Water Rights Board) and, in so doing, they must make "such investigations of the water resources of the State as may be necessary for the purpose of securing information needed in connection with applications for appropriations of water."[26] The Board (formerly Division of Water Resources) has never had to make recourse to this provision.[27] The Board must be prepared to pass judgment on amounts of available water and this implies, at least, the same authority to perform investigations on its own initiative as were previously more explicit.

After the Board receives a petition requesting the determination of the rights of various claimants to water and it finds public interest and necessity will be served by the requested adjudication, an order granting the petition is issued and arrangements made to proceed with the determination. Notice is published of the entry of the order granting the petition, and of notice of the pendency of the proceeding and of commencement of the investigation, including a statement of the duty of all claimants to water of the stream system involved to make proof of their claims. Thereafter at each significant stage of the administrative proceeding further notice is published. The Board at the time set in the notice of pendency, begins its investigation including making surveys, measurements, and preparation of maps, and gathering all data required for determination of the rights involved. The parties within a specified period are required to file proofs of claim in which claimants may contest each other's right deemed adverse to such claimant. After expiration of the time for filing of proofs of claim, all claims filed are abstracted and compiled into one document that may be published by the State Printer. Each party is served by registered mail with a copy of the abstract. Hearings are then held on contests between claimants and a determination is made as to each contest. An "Order of Determination" is then prepared and filed by the Board in its records. This constitutes the decision of the Board in the proceeding.

For good cause a rehearing may be granted by the Board. After expiration of the period for filing applications for rehearing, or determination of proceedings on rehearing, a certified copy of the Order of Determination is filed with the Superior Court of the county in which the stream system or part thereof is

[25] *Ibid.*

[26] State of California, *Water Code, 1955*, Printing Division, Sacramento. Section 1251, p. 50. See also Section 2501, p. 70.

[27] Personal communication from Henry Holsinger, Principal Attorney, California Division of Water Resources, November 9, 1955.

situated. Exceptions to the order may then be filed with the court and heard by it. The order, the exceptions thereto, and the proofs of claim constitute all necessary pleadings. Additional pleadings may be allowed by the court. Once the Order of Determination is filed in superior court, the proceedings follow closely the rules governing civil actions. The proceeding concludes with a decree of the court determining the rights of all parties affected.[28]

The statutory adjudication procedure has, so far, been restricted by statute to the adjudication of water rights concerning other than percolating ground water. The statutory adjudication procedure is instigated by the action of one or more claimants to the use of water who petition the State Water Rights Board to determine the rights of the various claimants to the water. It is in these two respects that the adjudication procedure differs markedly from the court reference procedure. As will be discussed below, however, the applicability of the court reference procedure to the adjudication of ground-water rights constitutes a most essential difference—and the basis for this research report.

Court Reference Procedure. The Water Commission Act of 1913 stated that when suit is brought in superior court the case may (at the discretion of the court) be transferred to the State Water Commission for investigation as referee.[29] The revision of the Water Commission Act by legislative amendment in 1917 separated the court reference procedure from the statutory adjudication procedure.[30] The revision modeled the statutory adjudication procedure after that used by Oregon.[31] The court reference procedure was revised again in 1931, not to change the legal intent or provision of the law but to clarify it by stating the procedure more precisely.[32]

During the period from 1914 to 1933 the use of the court reference procedure was restricted to use in water rights adjudication in surface water or water in subterranean streams flowing in known and definite channels.[33] Revision by legislative amendment in 1933 restricted the application of the phrase, "surface water, and to subterranean streams flowing through known and definite channels," to those sections of the Water Commission Act pertaining to the statutory adjudication procedure.[34] Such an omission combined with the general wording of the section of the act relating to the court reference procedure, was deemed sufficient to permit the court reference procedure to be applied to any and all suits brought in courts "of competent jurisdiction for determination of rights to water or the use of water."[35] Thus, there is no limit upon the category of water—surface or ground water—to which the court reference procedure may be applied.

The first application of the court reference procedure to ground water in California was in the Raymond Basin, *Pasadena* v. *Alhambra*, in which the reference was upheld by the State Supreme Court.[36] It is also to be noted

[28] State of California, *Water Code, 1955*, Printing Division, Sacramento. See sections 2500-2900 for the provisions affecting the statutory adjudication procedure.

[29] Section 24, Chapter 586, *Statutes and Amendments to the Codes, California, 1913* (Sacramento: California State Printing Office, 1913), pp. 1012-1033.

[30] Section 1, Chapter 153, *Statutes and Amendments to the Codes, California, 1917* (Sacramento: California State Printing Office, 1917).

[31] Section 539.020, *Oregon Revised Statutes, 1935.* See also Section 11, Chapter 216, *General Laws of Oregon, 1909.*

[32] Section 1, Chapter 1135, *Statutes and Amendments to the Codes, California, 1931* (Sacramento: California State Printing Office, 1931).

[33] Section 42, Chapter 586, *Statutes and Amendments to the Codes, California, 1913* (Sacramento: California State Printing Office, 1913).

[34] Section 1, Chapter 357, *Statutes and Amendments to the Codes, California, 1933* (Sacramento: California State Printing Office, 1933).

[35] Section 1, Chapter 1135, *Statutes and Amendments to the Codes, California, 1931* (Sacramento: California State Printing Office, 1931).

[36] *Pasadena* v. *Alhambra*, 33 Calif. (2d) 908.

that this reference procedure is discretionary, not mandatory with the trial court: "No positive duty rests upon the court to refer such a problem to the Division of Water Resources . . . but it may call upon that agency at any time for assistance."[37] Section 24 of the Water Commission Act, relating to the court reference procedure, was codified by legislative action in 1943 and enacted as a part of the Water Code of California.[38] No essential changes were made in the procedure by this action.[39]

Subjects of Reference.[40] In any suit relating to the determination of water rights brought in any court of competent jurisdiction in California, the court may order a reference to the State Water Rights Board. This reference may take one of two forms: The Board may act as referee to determine any or all issues involved in the suit. The court may refer the suit to the Board for investigation of and report on any or all of the physical facts involved. Thus far, all references relating to ground water have been based on the latter or narrow reference.[41] A "Report of Referee" is prepared after the State Water Rights Board has conducted its investigations in a particular reference. Copies are sent to all parties to the suit before filing the report with the court. After considering any objections to the report by parties to the suit—but not necessarily subscribing to them—a final copy of the report is filed with the initiating court. The report of the referee, as filed with the court, becomes *prima facie* evidence of the physical facts in the case. The court will also consider any evidence filed by parties to the suit. It is to be noted that the State Water Rights Board is not entitled to any fee for its services but does receive total reimbursement for all expenses incurred. This over-all procedure provides all parties with the services of an impartial investigatory agency at minimum cost. Furthermore, the interests of the public are protected by this participation of a state agency.

Comparisons with Legal Provisions in Selected Western States

Of the 17 Western States none has a court reference procedure that is in complete detail similar to that of California.[42] For California the prescribed

[37] *Allen* v. *California Water and Telephone Company*, 29 Calif. (2d) 466, at 489. See also Sections 2000 and 2001, State of California, *Water Code, 1955.*

[38] Section 2000-2050, Chapter 368, *Statutes and Amendments to the Codes, California, 1943* (Sacramento: California State Printing Office, 1943). Also, State of California, *Water Code, 1955*, Section 2000-2050.

[39] Furthermore, the basic principle of expediting the determination of conflicting water rights by reference to the State agency has been approved and upheld repeatedly by the State Supreme Court. See Wells A. Hutchins, *The California Law of Water Rights, op. cit.*, pp. 358-359.

[40] State of California *Water Code, 1955*, Section 2000-2001.

[41] The administrative interpretation of these sections of the water code as prepared by Henry Holsinger, Chairman, State Water Rights Board, is quoted by Wells A. Hutchins as follows:

"The administrative determination and application of Water Code Sections 2000 and 2001 consistently followed since early 1948 is set forth in the following. Section 2000 is direct authority for the reference by the Court to the Department of Public Works acting through the State Engineer of 'any and all issues' in a pending suit for determination of water rights. This authority is irrespective of whether those issues are of law or fact. The reference might, if the court in its discretion, saw fit, include all such issues. This would require receipt of all evidence substantially in the same manner and means as would the court hearing the cause in absence of a reference, under oath at formally called and held hearings. Section 2000 therefore authorizes a general reference. In a reference pursuant to Section 2001, it is not the practice to hold hearings, except informally. The objective of a limited reference is to afford the court the assistance of impartial and expert personnel in developing the facts essential to a just determination of the issues with a minimum of expense and delay. The direct methods of collecting evidence employed in case of a reference under Section 2001 could not be utilized under a general reference pursuant to Section 2000. It is the considered view therefore that a general reference pursuant to Section 2000 et. seq. would defeat that objective. In all instances, where, as has occasionally occurred, the court has referred all issues pursuant to Section 2000, a motion has promptly been made and granted to modify the order in accord with the views here expressed." Wells Hutchins, *op. cit.*, p. 357.

[42] Wells A. Hutchins, "Special Procedures for Adjudication of Water Rights and Supervision of Diversion: General Survey of Types of Procedures in the Western States." Presented at Texas Water Law Conference, sponsored by University of Texas School of Law, Austin, Texas, May 25, 1956.

procedure is stated in great detail in the Water Code.[43] In the other states such procedures are only briefly outlined and have never been well developed.[44]

In Nevada, New Mexico, North Dakota, and Oklahoma, when a suit to determine water rights is filed, the court shall direct the state administrator to furnish hydrographic information. The same holds true for Oregon if the state is party to the action. Such direction by the court for hydrographic information is optional in Montana and Utah but in Idaho and South Dakota such requests by the court are mandatory. Furthermore, n Arizona, Nevada, and Oregon, any suit to determine water rights may be transferred by the court to the state administrative agency for determination under the complete statutory adjudication procedure.

Court Adjudications. Colorado and Texas are states in which adjudication of ground-water rights are determined by court proceedings with little or no aid from the state agent or agency responsible for regulating use of the water resources.[45] In these states the parties to a court action must provide their own physical facts and expert witnesses. In such situations testimony and evidence frequently may reflect considerable selectivity and bias depending upon who pays the expenses involved. The court must consider testimony and evidence offered—much of it completely contradictory—and reach an equitable decision. There is no impartial referee to investigate the facts and issues of the case. Lack of such an impartial aid to the court puts greater strain upon the judiciary and may provide greater opportunity for reaching something less than an equitable decision.

It is also significant to note that *complete* reliance on court decisions may tend to decrease the over-all efficiency of adjudicating water rights. Each decision reached in a court of law adds to the existing legal base—the basis for *future* legal decisions. Each particular decision, however, is related to *current* understanding of hydrologic principles and details of water availability and may be highly localized in nature. In any decision the evidence may be inadequate or biased or both. Thus this legal base for future decisions may or may not be adequate even for the specific local question under litigation. Most certainly when a decision is accepted as a precedent in subsequent suits it should be recognized as necessarily provincial, not only because of limitations on specific hydrologic information underlying the decision but also because of the "water philosophy at the place and time that the decision was rendered."[46]

The courts are dependent upon the practice of basing findings upon legal precedent and tradition. In so doing the courts have rendered impartial *legal* decisions because their conclusions have been made by justices who can be acknowledged as impartial experts on legal matters. Too frequently, however, the facts and evidence that form the basis for the legal decisions are inadequate both in terms of historical precedent and current situations. If current legal de-

[43] State of California, *Water Code, 1955,* Sections 2000-2076.

[44] Wells A. Hutchins, personal communication. See also: Hutchins, *Selected Problems in the Law of Water Rights in the West, op. cit.; The California Law of Water Rights, op. cit.; The Idaho Law of Water Rights,* (Boise, Idaho: Idaho State Department of Reclamation, 1956); *The Oklahoma Law of Water Rights,* (Oklahoma City, Oklahoma: Oklahoma Planning and Resources Board, 1955); and *The New Mexico Law of Water Rights* (Santa Fe, New Mexico: State Engineer of New Mexico, 1955).

[45] Provision for state help in other states is limited in scope. For example: Idaho provides for administrative determinations of adverse ground-water claims, and for adjudications in which the court may call on the State Reclamation Engineer for help. New Mexico adjudication procedures, which include the help of the State Engineer, include ground water. Presumably the similar North Dakota and South Dakota procedures would do likewise.

[46] H. E. Thomas, "Water Rights in Areas of Ground-Water Mining," *Geological Survey Circular 347* (Washington, D. C.: Geological Survey, United States Department of the Interior, 1955), p. 7.

cisions in states completely dependent upon court adjudication are weak and inadequate because of too great reliance upon historical precedent or current facts, then there is real need for sound and impartial investigations of hydrologic fact in each litigation involving water-rights adjudication. The court reference procedure as operative in California supplies this need.[47] The additional service of an impartial referee to determine matters of hydrologic fact improves the effectiveness of economic change in affecting court decisions.

Statutory Adjudications. Nebraska and Wyoming place great reliance upon the fact-finding role of their authorized state agent in water rights determinations. In these states the agent and /or agency not only investigates the physical facts involved, but also determines and allocates determined water rights. These determinations are filed in the courts and unless appealed by the affected parties within a specified time period become final adjudications. If appealed, then the action takes the nature of an ordinary civil action. In Utah the procedure relies more heavily on court action in that a preliminary determination by the State Engineer must be affirmed or modified by court decision in order to become a final adjudication. Although not a statutory adjudication procedure as described above for California, this approach can lead to the accomplishment of the same objectives.

It is interesting to note that the former, more administrative procedure (the so-called "Wyoming Method"), after adoption by Nebraska, was appealed to the State Supreme Court and held to be valid. On the other hand, after adoption by Texas, and appealed to the State Supreme Court, the same procedure was held to be invalid.[48] Thus an identical procedure affecting adjudication of ground-water rights may be viewed differently in two states.

A United States Supreme Court decision relating to a similar question, under the so-called Oregon Method, is of interest in this matter.[49] The Supreme Court held that the proceeding before the water board merely paves the way for a court adjudication. In the final analysis the courts can accord all the evidence "its proper weight and value." In rendering this decision the Court emphasized that the proceedings before the water board *and* the court are parts of a single statutory proceeding. The report of the board under the Oregon Method is not conclusive but is preliminary to a court adjudication of the rights involved. Under the Wyoming Method it is necessary for the affected parties to appeal the decision of the water board or the decisions of the water board become final.

Thus it seems clear that an administrative agency may properly act in a quasi-judicial capacity where its actions together with those of the court form a part of a single statutory proceeding. Whether an administrative agency may similarly act where its proceedings are not an integral part, together with the court action, of a single proceeding still remains to be settled. It is observed that quasi-judicial determinations are tolerated far more now than 50 years ago. But since water rights are real property the possibility of general acceptance of such procedures for settling water rights disputes remains indeterminate.

In any event the role of the unbiased and objective investigations by such

[47] Integration of a court reference procedure with a statutory adjudication procedure might even strengthen this function.

[48] *Water Resources Law*, Vol. 3 of the Report of the President's Water Resources Policy Commission. 1950, p. 777.

[49] *Pacific Livestock* v. *Lewis*, 241 U. S. 440, at 451. It is to be emphasized that this decision of the Supreme Court refers to the "Oregon Method"; the U. S. Supreme Court has never passed on the "Wyoming System."

agencies serve to protect the interests of the public as well as those of the individuals directly concerned. So long as the courts either make the final decision or may be appealed to for such decisions, the result will be just as equitable and will usually be reached more expeditiously. The investigations of an impartial referee are then an ordinary part of the water-rights determination and adjudication. Where final court adudication is an integral part of the statutory adjudication procedure, the part played by the State Engineer (or other authorized agent) is even more clearly an integral part of the due process of law. It also seems clear that the court reference procedure and the statutory adjudication procedure could be combined into a single procedure that would serve the same ends and simplify adjudication of ground-water rights.

The Court Reference Procedure Applied to Ground Water Basins in California

The Raymond Basin Reference. The Raymond Basin Court Reference was the first instance of the adjudication of conflicting water rights of many owners of ground water in California. On September 23, 1937 the city of Pasadena initiated litigation in the Superior Court of Los Angeles to quiet title to ground-water rights within the Raymond Basin.[50] Specifically involved were the rights to divert water from the ground-water basin. This action was precipitated by an increasing concern over the steadily increasing pumping lifts in the area. This situation finally stimulated enough concern that court action was taken.

On January 31, 1939 twenty of the original thirty-one parties to the suit petitioned the court to refer the matter to the Division of Water Resources for investigation. The Division was appointed referee in this court case on February 8, 1939.[51] The reference order called for investigation of all physical facts involved in the action and to report thereon. Conclusions of the investigation were to specify the safe yield of the area, the surplus water if any, and the overdraft if any. In addition, the court order recommended to the parties of the suit that the parties to the action appoint engineers to collaborate with the Division. Thirteen parties to the suit appointed such engineering consultants. The referee was in contact with this group during the entire investigation.

The Division of Water Resources formally served its draft of the Report of the Referee upon all parties on March 15, 1943.[52] After minor revisions the Report of the Referee was submitted to the court on July 12, 1943. On the basis of this report the trial court entered judgment on December 23, 1944, defining the water rights of the litigants. All of the parties with rights to pump ground water did not enter the suit; therefore, the court defined the decreed water rights as equal to the safe yield less the estimated rights of the many parties with small quantitative rights not in the suit.

Prior to final judgment, but after the Report of the Referee was filed, twenty-five of the parties to the suit entered into a water exchange agreement. This agreement provides a means by which any party can meet its demands for water in excess of its decreed right by purchase of pumping rights when offered by other parties. This water exchange agreement was made a part of the above mentioned final judgment.

[50] *City of Pasadena* v. *City of Alhambra, et al. No. Pasadena C-1323.*

[51] *Report of Referee* (Raymond Basin Reference), p. xxi-xxiii.

[52] Objections to the draft were filed by twelve of thirty-one parties. Several objectors stated their objections were filed only to preserve their right to present argument in court if the proposed plan for settlement were not adopted by the court. *Ibid.*, p. xxvii.

The judgment was upheld by the California Supreme Court in June 1949.[53] The term *mutual prescription* as applied to ground-water basins was used by the appellate court. But mutual prescription was not mentioned specifically by the Supreme Court in arriving at their decision: it specifically refrained from so doing by stating:

"We need not determine whether the overlying owners involved here retained simply a part of their original overlying rights or whether they obtained new prescriptive rights to use water. . . . The question might become important in order to ascertain the rights of the parties in the event of possible future contingencies, but these may never happen."[54]

The final holding on the main issue was that prescriptive rights were established by the later appropriators against both overlying owners and prior appropriators and that the latter also obtained *or* preserved rights by reason of the water they pumped.[55] A petition to the United States Supreme Court for a writ of certiorari by the California-Michigan Land and Water Company was denied on April 17, 1950.[56] With this action the lengthy litigation of nearly thirteen years was terminated.

By action of this judgment the court appointed the Division of Water Resources as Watermaster charged with administering the terms of the judgment and the 1943 water exchange agreement.[57] The State Engineer created the Raymond Basin Watermaster Service Area embracing the area covered by the judgment. On July 1, 1944 the Watermaster assumed the responsibility of administering provisions of the judgment and reporting any violations to the court. Since that date the Division has regulated ground-water extractions in the Raymond Basin Area according to the terms of the judgment. Up to June 30, 1954 average annual extractions have been kept within 1.5% of the 1937-1938 safe yield volume.[58] Detailed accounts of watermaster service operations are contained in annual reports submitted to the court and parties to the decree.

Review of the Determination of Safe Yield. A rise in ground-water levels from 1944 to 1950 induced the City of Pasadena to petition the court for a redetermination of safe yield.[59] On November 17, 1950 the court ordered the Division as Referee to redetermine the safe yield of the Raymond Basin Area.[60] This redetermination increased estimated safe yield of the area by 40.5 percent. As a result of this redetermination the court has ordered an

[53] *Pasadena* v. *Alhambra*, 33 Calif. (2d) 908.

[54] *Pasadena* v. *Alhambra*, 33 Calif. (2d) 908, at 932.

[55] In commenting on this involved point of water law Mr. Wells A. Hutchins has written to the author: "Thus the Supreme Court in resolving the issues in the *Raymond Basin* case, found it unnecessary to decide between *obtaining* and *preserving*, and in doing so it followed the better judicial practice of leaving that decision to the future in some case in which the issues should require that the decision be made. Had the Supreme Court, in resolving the issues of the *Raymond Basin* case, stated its views one way or the other when not required to do so, the statements would have been simply *dicta* and hence of doubtful authority in future litigation. When and if a case reaches the Supreme Court in which the facts are such that one concept or the other must be adopted in deciding the controversy, that decision will be authority for whatever principle it adopts and applies. The *Raymond Basin* case is not authority for either the concept that parts of old rights were preserved, or the concept that new prescriptive rights were obtained."

[56] *California-Michigan Land and Water Company* v. *Pasadena*, 339 U.S. 397.

[57] Confirmed by Article IX of the Judgment dated November 23, 1944. An earlier order dated April 5, 1944 marks the original appointment.

[58] California Division of Water Resources, *Report on Watermaster Service*, July 1, 1953 through June 30, 1954, p. 12.

[59] Article XXI of the 1944 Judgment provided for a review of the safe yield determination upon petition by any party—but no more frequently than at five-year intervals. The Supreme Court disapproved the trial court's provision for sharply limited retention of jurisdiction and struck out such provision, inserting its own approved version thereof providing for very broad retention of jurisdiction. The Supreme Court stated that the court should retain continual jurisdiction over the redetermination or review of the safe yield determination upon petition by any party. *Pasadena* v. *Alhambra*, 33 Calif. (2d) at 920.

It is an interesting circumstance that the Supreme Court (apparently) overlooked the provision of Water Code Section 2900 which expressly authorizes only limited retention of jurisdiction.

[60] *Report of Referee* (Review of Determination), *op. cit.*

increase in adjudicated water rights of approximately 30 percent.[61]

Any party to the action may petition the court for future redetermination of safe yield and modification of decreed rights as the City of Pasadena did in 1950. This does not alter the legal finality or the form of the adjudication. The Raymond Basin Reference Case can be considered as a terminated *legal* adjudication of ground-water rights. However, this does not make it final in the *economic* sense—provision exists for future adjustments in the quantitative magnitudes of water pumped from the basin if the need arises.

The West Coast Basin Reference. Salt water intrusion and resultant inferior quality of ground water accompanied the decline in water levels experienced by ground-water users in the West Coast Basin Area. *The Report of the Referee* in the West Coast Reference details the many investigations that took place prior to the initiation of legal action.[62]

Legal action opened on October 24, 1945. The plaintiffs in the action sought to quiet title to the ground-water rights of each and every party involved. Also requested was regulation and reduction of ground-water extraction from the basin so that the supply would not be further depleted.

On July 26, 1946 the court ordered a reference to the Division as referee. The court requested the referee to define the extent and boundaries of the West Coast Basin and to report on the physical facts involved. The physical facts were more involved in this reference, however, than in the Raymond Basin. The complexities of the added problem of salt water intrusion has been discussed earlier. The court recommended to the parties to the suit that they appoint engineers to aid the referee in the investigation. Nineteen engineers made up this "Engineering Advisory Committee" and represented a total of 29 parties to the suit. This committee served as an advisory group to the referee during the entire period of the investigation.[63]

Early in the investigation the referee requested that additional parties be brought into the action. The referee stated this was necessary if all issues in the reference were to be determined completely. A court order of November 9, 1949 directed the plaintiff to bring in nearly 400 additional parties.[64] The plaintiffs filed an amended complaint listing the additional defendants on December 5, 1949. At this time the plaintiffs also alleged that the rights and claims of each and every party to the action were adverse to each and every other claim. This move will make it easy for the court to reach a conclusion similar to that reached in the Raymond Basin decision with respect to the prescriptive rights of the parties to the adjudication. The referee filed their *Draft of Report of Referee* on February 15, 1952. A total of 38 objections were filed with the court and transmitted to the referee. The final *Report of Referee* was issued on June 27, 1952. At the present time the case is pending in court on exceptions filed with the court to the report of the referee.

Interim Agreement. The large number of parties in the suit and the complex

[61] Modification of Judgment, *Pasadena* v. *Alhambra* (In the Superior Court of the State of California in and for the County of Los Angeles), April 29, 1955. Kurtz Kauffman, Judge of the Superior Court.

[62] *Report of Referee* (West Coast Basin Reference), *op. cit.*

[63] While the investigation was under way, local interests were active in attempts to evaluate the overdraft problem. Several citizens' groups of water users and producers superseded one another from 1943 to 1947. This activity culminated in the formation of the West Basin Municipal Water District on November 25, 1947. This unit was organized to facilitate joining the Metropolitan Water District—and thus secure a supplemental supply of water from the Colorado River. *Ibid.*, pp. 2-3.

[64] Before the referee's study was completed, 472 parties were involved in the action.

issues under litigation will require a long involved trial. All parties to the action are well aware of the serious nature of the problem however. The referee was not able to specify the safe yield of the basin but recommended that ground-water extractions be limited to 30,000 acre-feet per year.[65] Ground-water extractions for the period 1932-1950 averaged 60,600 acre-feet per year growing from less than 50,000 acre-feet per year in 1932-33 to more than 80,000 acre-feet in 1949-50. And the upward trend was continuing. Clearly, the rate of ground-water extraction was several times greater than the average annual replenishment. The trend would continue unless something was done.

Due to the seriousness of the ground-water situation and the long-time period before a final adjudication will be forthcoming the parties to the suit have executed an Interim Agreement. This agreement became effective on March 1, 1955 and has reduced ground-water extractions by about 25 percent from the 1952-54 rates.[66]

Ground-water extractions have been reduced significantly as a result of the agreement. The volume of water pumped by each party was based on the referee's report of ground-water extractions. They constitute—and are labeled as—Prescriptive Rights, 1949.[67] Section 9 of this agreement states that no action performed under the agreement shall affect the water rights of the parties to the suit. The agreement was designed to reduce the volume of overdraft and preserve the status quo of the rights of the parties during the process of litigation. This was accomplished. Final adjudication will probably await Supreme Court review. This may take many years. The case probably will be argued in Appellate Court as well as Superior Court before the case goes to the Supreme Court.[68] But in the meantime significant reduction in overdraft has been accomplished and even greater reduction may result from the trial court judgment.

The Economic Function of the Court Reference Procedure[69]

The relative scarcity of the ground-water resource in the Raymond Basin and the West Coast Basin has been recognized for many years. Water use has been sufficient to deplete the resource over time. Until the enforcement of the safe yield ration in the Raymond Basin by the courts and the importation of supplemental water the deficit was made up from the ground-water stock—and rapidly increasing pumping lifts were the result. Increased pumping lifts and salt water intrusion in the West Coast Basin attest to the continued scarcity of ground water in this area. The use of the Interim Agreement to reduce pump draft has slowed down the rate of overdraft but has not eliminated it. Thus the Court Reference Procedure and associated institutional devices play an important role in allocating the resource among its various uses. The economic implications of this procedure are important to all persons concerned with ground-water development and use.

[65] *Report of Referee* (West Coast Basin Reference), *op. cit.*, pp. 126-130.

[66] Personal communication from Mr. Max Bookman (Los Angeles: Division of Water Resources) December 1955.

[67] Defined as "the highest continuous production of water by each user for beneficial use in any five-year period prior to October 1, 1949, as to which there was no cessation of use by it during any subsequent continuous five-year period prior to October 1, 1949." *Interim Agreement and Petition, California Water Service Company* v. *City of Compton, No. 506806* (In the Superior Court of the State of California in and for the County of Los Angeles), February 16, 1955.

[68] A move has been made to secure a stipulated judgment at an early date. Whether this can be secured remains to be seen, however.

[69] For a more thorough discussion of the economic function of the court reference procedure see: J. Herbert Snyder, "Economic Implications and Appraisal of the Court Reference Procedure for Allocating Ground Water," *Ground Water Economics and the Law* (Berkeley, California: Report No. 5 of the Committee on the Economics of Water Resource Development of the Western Agricultural Economics Research Council, December 1956), pp. 37-65.

In allocating the resource among its several uses, reliance has been made on the validity of the water rights possessed by the individual user of the ground-water resource. The amount of the resource that an individual user has been allotted is dependent upon a history of beneficial use of the resource. Thus individual water users can continue to use the amount of water rationed by the court at whatever price exists or under whatever conditions for pumping may exist among individuals. Limiting the amount of total draft provides an element of security for the individuals—security against future drastic increases in pumping lifts and pumping costs. Furthermore, these rights can be modified with respect to quantity and exchanged in the market providing for flexibility in use of the water over time.

Management of Ground-Water Resources. Management of ground-water basins for use of the water resource involves the two important criteria just mentioned with respect to economic decision making—flexibility and security. On the one hand, in order to develop water resources, to undertake capital expenditures, and to commit resources other than the water resources to long-time development, it is desirable that there exist a certain degree of security over time with respect to use of the resource. On the other hand, the desire to change the commitments and decisions that have been made in response to changes in the economy creates the desire for a reasonable degree of flexibility with respect to availability of the resources and the use to which the resource may be put.

Flexibility and Economic Decisions. Flexible aspects of the riparian doctrine as applied to ground water—the correlative rights doctrine—have facilitated the development of the ground-water resource in the course of economic change. This aspect of the correlative rights doctrine has not yet been fully tested under economic conditions where ground-water development cannot be "firmed up" subsequently by additional water development. The rationing induced in the Raymond Basin and West Coast Basin area merely provides for a reduction in use of relatively inexpensive local ground water and supplementation by making use of relatively expensive imported surface water.

Security and Economic Decisions. Development, management, and use of water in ground-water basins requires long-run security for the individual developing or making use of the water. He must be certain that all deferred revenues and costs of the development and use can be accounted for and fully compensated over time. The adjudicated pumping shares of each individual based on the Referee's finding provide for a secure right to pump ground water and protect, to a degree at least, previous commitments.

Economic Decisions and Ground-Water Use. One of the key characteristics of an operating economy is the change inherent in that economy. Normal operations of an economy possess the elements that allow for economic flexibility as well as economic security over time. The imposition of a legal framework upon the operation of an economy should allow for the economic change over time of that economy. Thus, absolute dependence or reliance upon a single legal doctrine that provides some elements of flexibility, for example, but little or no security would not be conducive to the best operation of the economy. On the other hand, a legal process that would establish security but not permit flexibility over time would be equally awkward. Thus a single legal process, if it is

to allow for normal operations of an economy, must take into account both the security and flexibility aspects of the operation of that economy.

The court reference procedure as applied in the Raymond Basin case and as preliminarily applied in the West Coast Basin case has both the flexibility and the security aspects necessary to normal operation of an economy built into the process. There is provision for change in the amounts of water that may be extracted from the ground water by a particular user. It is in this context that security and flexibility of water rights can be regarded as important economic criteria: "Both relate to significant conditions which facilitate or impede an increase of national income in a world of persistent but uncertain change."[70] There is also the provision for new users to make an application for water in these areas. The satisfaction of the new users requirements, however, can be met through use of supplementary imported surface water. There has been no situation, as yet, in which the Court Reference Procedure in California has been applied to a situation in which there is no supplementary water available.

Can the Court Reference Procedure Be Improved?

A Lengthy Process. The adjudication of ground-water rights is a lengthy process. The Raymond Basin Reference directly concerned 27 water rights from an area of 25,217 acres involving a safe yield (1951-52) of 30,770 acre-feet. Thirteen years were required for the entire litigation. The West Coast Basin Reference directly concerns 472 water rights from an area of 101,000 acres and involves recommended extractions (1952) of 30,000 acre-feet. Ten years have already elapsed—and many more may be required before litigation is terminated.

The mechanics of the court reference procedure are simple and straight-forward—but the process is very time-consuming. Proceedings in the trial court took nearly three years for the Raymond Basin Reference. Proceedings in the Appellate and Supreme Courts took nearly four and one-half years.

The referee's investigation in the Raymond Basin Reference took nearly four and one-half years. This could be considered a very long time—for a simple physical investigation. But the physical facts of ground-water hydrology are not simple. Surface reservoirs can be measured easily but to evaluate ground-water storage is a difficult and complex task.[71] Essential facts can be gathered only after long and patient effort. Furthermore, these facts are presented in open court—where they must stand the searching scrutiny and criticism of the parties to the suit.

The referee's investigation in the West Coast Basin took nearly six of the ten years thus far consumed. The West Coast Basin is four times as large as the Raymond Basin. The physical setting is more complicated. Nearly five hundred water rights are involved. The final report—of sufficient detail and accuracy to withstand court-room presentation—consisted of the one-volume report and fourteen volumes of basic data. Except for two volumes the set consists entirely of tabular presentation of basic data.[72] And yet the West Coast Basin is

[70] S. V. Ciriacy-Wantrup, "Concepts used as Economic Criteria for a System of Water Rights." *Land Economics*, November 1956, pp. 295-311.

[71] J. Herbert Snyder, *Ground Water in California: The Experience of Antelope Valley, op. cit.*, pp. 18-53.

[72] The first two items are reports of special studies; the remainder contain tabulations of basic data: (1) Report of Cooperative Investigations on Consumptive Use of Water in the West Coast Basin. (2) Geology of the West Coast Basin. (3) Location and Description of Wells (four volumes). (4) Well Logs and Zonal Classification (two volumes). (5) Analysis of Ground Water from Wells. (6) Measured and Estimated Ground-Water Production (two volumes). (7) Records for Ground-Water Levels at Wells (three volumes).

a relatively small area. The major part of the referee's time was spent compiling the basic data on ground-water extractions and ground-water hydrology. The physical facts of geology and ground-water hydrology cannot be simplified greatly. The amount of information desired probably cannot be lessened materially. But there appear to be other possibilities for simplification in the over-all process.

Ground-Water Extraction Records. At least part of this problem was solved by legislative action in 1955. SB 1557 of the California Legislature, as enacted July 9, 1955, requires recording of ground-water extractions.[73] The requirement is limited to Riverside, San Bernardino, Los Angeles, Ventura and Santa Barbara counties in Southern California—for the most part an area characterized by over-drawn ground-water basins. The act requires each person extracting more than twenty-five acre feet per year from ground water to file annual notice of extraction and diversion of water with the State Water Rights Board. Furthermore, the first notice filed (effective for March 1, 1956 filing) must record extractions and diversions for the previous ten-year period.

This act has an important effect on ground-water rights in the five county area. Section 5003 states that:

"No prescriptive right which might otherwise accrue to extract ground water shall arise or accrue to, nor shall any statute of limitations operate in regard to such ground water in the five counties or any of them after the year 1956 in favor of any person required to file such notice of extraction and diversion of water, until such person shall file with the division the first 'Notice of Extraction and Diversion of water' . . . , and as to each person who fails to file such notice by the end of the year 1957, it shall be deemed for the period from that time until the first notice of such person is filed, that no claim of right to the extraction of ground water from any such source in the five counties has been made by such person, and that water so extracted by such person from such ground-water source during such period has not been devoted to or used for any beneficial use. The beneficial use of water from any ground-water source within the five counties in any year by such person shall be deemed not to exceed the quantity reported in the notice filed for such year."

Thus, not only are ground-water rights *per se* established, but also some measure of their magnitude. The ground-water rights of persons extracting less than twenty-five acre-feet per year are also protected in Section 5004:

". . . . this section and Section 5003 shall not apply to any person whose aggregate extractions of ground water in any year does not exceed 25 acre-feet nor to any extractions of ground water with respect to which no notice is required to be filed under this part."

This information, on file with the State Water Rights Board, will simplify one of the most difficult parts of the referee's job in future references—that of determining the history of beneficial use of ground water by pumpers. It is impossible to state how much time and expense will be saved in any particular investigation—but it will be a significant saving.

Interim Agreements and Pumping Injunctions. The use of an interim agreement to reduce ground-water draft has been described for the West Coast Basin Reference. Without some such instrument the important ground-water storage resource could be destroyed by salt-water intrusion before final litigation in this case. The interim agreement has reduced draft and lessened the likelihood of destruction of a vital resource. At the same time ground-water rights have been protected.

A 1953 legislative amendment provides authority for the State Water Rights

[73] Chapter 1869, *Statutes and Amendments to the Codes, California, 1955.* Adds Part 5 of Division 2 to the Water Code, Sections 4999-5008, inclusive.

Board to request an injunction restricting —on an equitable basis—the amount of ground water pumped.[74] This section is restricted to five southern California counties in the arid coastal area and may be applied only after the Board has filed its report.[75] This section was adopted because the court litigation following the filing of the referee's report is frequently very lengthy. Action such as this should be permitted in any area of ground-water overdraft. Without such a procedure irreparable damage to ground-water quality or loss of ground-water storage might result before final determination of the water rights by court decree. The use of these instruments will not speed up the court reference procedure. But the impact of the referee's investigation will take effect earlier. Final adjudication of ground-water rights will not be hastened. But reduced draft on ground water during litigation effected by such an agreement will not distort the final adjudication.

Another advantage of the use of interim agreements and pumping injunctions is that it permits a proposed plan to be tested before a final decree is made. Several different arrangements as to total draft volume could be tried. The very important element of location of pump draft could be varied and the effect of different locations of extractions compared. Such testing of tentative solutions would lead to more satisfactory final decrees—in both economic and physical contexts.[76]

Reduce the Number of Parties. There is no reason why the number of litigants in the court reference procedure could not be reduced. In the West Coast Basin Case this litigation includes potentially 472 parties. However, only 108 parties had individual prescriptive rights of twenty-five acre-feet or more per year (Table I). These 108 parties had prescriptive rights to 66,561.3 acre-feet of water per year—or 98.2 percent of the total prescriptive rights to ground water.

It appears that unnecessary expense and effort was incurred in the West Coast Basin Case by including all parties with any (implied or actual) ground-water rights.[77] If the investigation had centered on the 108 parties instead of 472, then 98.2 percent of the interests involved would have been included. For all practical purposes the remaining 1.8 percent could be ignored. This has been the actual result of this interim agreement. Only 70 percent of the prescriptive ground-water rights involved were required to make the agreement effective—and effect reduced draft by all parties.

Why could not the referee's investigation be limited to those ground-water rights that represent the upper 90 percent or so of the total? This would simplify the amount of work to be done by the referee. The time period involved would be shorter. Ground-water rights of those persons producing less than, say, twenty-five acre-feet per year could be protected by statute—as they have been in the water extraction legislation cited above. Furthermore, court action would be less time-consuming if fewer parties were involved in the suit. Final adjudication

[74] Chapter 1690, *Statutes and Amendments to the Codes, California, 1953.* See also Section 2020, State of California. *Water Code, 1955.*

[75] The area is defined by the exterior boundaries of the counties of Santa Barbara, Ventura, Los Angeles, Orange and San Diego.

[76] The court reference procedure contains sufficient authority to effect trial solutions. Legislative action in 1955 established the right of water replenishment districts under certain conditions to control location of ground-water extractions. (See State of California. *Water Code, 1955,* Division 18). Presumably, trial courts could acquire similar authority.

[77] The costs associated with and leading to the delivery of subpoenas to the parties added to the suit by the amended complaint of December 5, 1949 cost the plaintiffs in the suit over $110,000. (T. R. Simpson, formerly Principal Hydraulic Engineer, California Division of Water Resources.)

TABLE I—Classification of "Prescriptive Water Rights, 1949" West Coast Basin, California

Range of individual ground water "Prescriptive Rights, 1949"	Number of parties within each range	Total volume of ground water within each range	Cumulative	
acre-feet		*acre-feet*	*Number of producers*	*Volume of water acre-feet*
0— 0.9.....	176	36.0	192	36.0
1.0— 4.9.....	92	219.4	284	255.4
5.0— 9.9.....	37	273.0	321	528.4
10.0— 14.9.....	20	246.2	341	774.6
15.0— 19.9.....	14	247.3	355	1,021.9
20.0— 24.9.....	9	205.6	364	1,227.5
25.0— 49.9.....	33	1,174.8	397	2,402.3
50.0— 74.9.....	12	719.2	409	3,121.5
75.0— 99.9.....	12	1,034.3	421	4,155.8
100.0— 199.9.....	12	1,586.0	433	5,741.8
200.0— 299.9.....	10	2,563.0	443	8,304.8
300.0— 399.9.....	3	1,077.0	446	9,381.8
400.0— 499.9..	1	427.0	447	9,808.8
500.0— 999.9.....	9	6,977.0	456	16,785.8
1,000.0—1,499.9.....	2	2,178.0	458	18,963.8
1,500.0—2,499.9.....	4	7,470.0	462	26,433.8
2,500.0—4,999.9.....	9	32,991.0	471	59,424.8
5,000.0—9,999.9.....	1	8,364.0	472	67,788.8

[1] Exhibit A. *Interim Agreement and Petition, California Water Service Co.* v. *City of Compton. Los Angeles No. 506806* In the Superior Court of the State of California in and for the County of Los Angeles, February 16, 1955.

could be reached more rapidly and enforced just as easily.

The court reference procedure as a legal process appears to be adequate to adjudicate ground-water rights in specific ground-water basins. It is a legally valid process that satisfies an immediate economic need. It can be improved and made more efficient, however, if basic data are gathered in advance, if interim agreements or court injunctions are used, and if only the major water-rights —selected on some justifiable predetermined basis—are actually included in the process.

The foregoing analysis has endeavored to show that the court reference procedure may be used as an effective overall means for allocating ground water and protecting ground-water rights. It satisfies both economic and legal criteria for effectiveness. Adoption of suggested improvements will serve to strengthen its effectiveness.

Resource Use in Thailand

By GERALD E. KORZAN*

CRITICISM of countries such as Thailand because inefficient use seems to be made of their resources is implied in referring to them as underdeveloped. They are underdeveloped by western standards, but are they really underdeveloped within their own setting? It is well known they do not have the resources and technology of the United States. Yet many people wonder why they do not move forward rapidly, particularly when the leadership seems progressive, and considerable outside financial support is given them. There must be valid reasons.

This paper will deal with two hypotheses: (1) that there is considerable logic in resource utilization in Thailand within the prevailing frame of reference, and (2) that progress in all likelihood will come slowly because improvements in education, communication, transportation, capital accumulation, and adjustments between the rural and urban labor forces will be unavoidably slow.

Thailand, about the size of Texas and with a population of 20 million people, is located in southeast Asia between Burma and Indochina. Bangkok, the largest city in Thailand and the seat of government, is located on the principal river about 20 miles from the Gulf of Siam. The rainfall during the normal crop year (June-January) in the important crop-producing areas ranges between 30 and 80 inches.[1] In spite of what may seem to be adequate rainfall, there were 60 drought years during a period of 115 years.[2] During the same period the crops suffered from flood damage during only four years. Hence, supplemental irrigation is essential in Thailand. About 25 percent of the land is now irrigated and additional projects are under way.

According to the 1950 census, there were 2.1 million farms in Thailand, the average size of which was nearly 11 acres. An average of eight acres was cultivated, and 87 percent of all farm land was owned by the operators.[3] A fairly typical farm had total assets of $1,117[4] of which 70 percent was invested in land and buildings. Its livestock consisted of two buffaloes, two cattle, two hogs, and 20 chickens. Buffaloes provide nearly all the farm power. The value of hand and animal tools was $28. One farmer in 33 had some power equipment which usually consisted of a stationary-engine-operated water pump. In the crop year 1952-1953, the average cash family income was $186, of which $84 was non-farm income.[5] Farm operating expenses of $32 and cash living expenses of $137 left only $17 a year for purchase of capital goods and for savings. Value of farm production for home use (excluding shelter) was $84 which indicates farmers were only about 30 percent self-

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[1] The minimum water requirement for wet rice production is about 70 inches annually.

[2] *Thailand and Her Agricultural Problems*, Ministry of Agriculture, Bangkok, Thailand, November 1950, pp. 42-3.

[3] In 1952-1953 the Thai Government, in cooperation with FAO, obtained data pertaining to farm organization, receipts, and expenses from a sample of about 6,000 farmers. The results of this study can be found in: *Thailand Economic Farm Survey*, Division of Agricultural Economics, Ministry of Agriculture, Bangkok, Thailand, 1953.

[4] One dollar equals 21 baht.

[5] The total man-days of work per farm was 320 for an average of about 100 days for each worker. The farm family also worked a total of 132 days in nonagricultural employment which was largely outside labor and home industry.

sufficient. Another study shows farmers to be about 50 percent self-sufficient.[6] In any case farm levels of living in Thailand cannot be compared directly with those in the United States on the basis of relative cash incomes. Goods and services produced in Thailand sell for much less than those produced in the United States.

Rice is the principal crop in Thailand. Rice was produced on 88 percent of all the farms and on about 80 percent of the cultivated land. All other products raised on farms such as corn, cotton, peanuts, soybeans, sugar cane, tapioca, tobacco, vegetables, fruit, and livestock contribute to the welfare of the people but have little importance in external trade.

Except for plowing and harrowing, which are done by water buffaloes or bullocks, nearly all farming operations are manual. Levees or dikes surrounding each small field are made by hand; young rice plants are removed from seedbeds and transplanted by hand; the crop is harvested with hand sickles; much of it is carried to the threshing floor on the backs of men or women, and the heads are threshed by having buffaloes trample them. The straw and trash are winnowed out of the paddy with hand baskets or, if a threshing machine is used, it is generally turned by hand.

The manufacturing industry of Thailand accounted for nearly 14 percent of the national income in 1954.[7] The important industrial activities are government-owned enterprises started by the several ministries or by government monopolies for processing local raw materials. Among these are the cigarettes and liquor industries which turn out good quality products at reasonable prices. Other government-owned plants are a gunny-bag factory, sugar factory, a paper mill, and a tannery. New government-owned plants in 1954 included an alum factory and a fish-meal plant.

A cement plant is the largest privately-owned factory in Thailand. It employs 1,300 people and had an annual rate of production of 364,000 tons in 1954. A cotton mill (yarn) and a glass factory are two other commercial plants operated with private capital. There are, of course, many other private enterprises, all of which are small. In fact a large part of manufacturing in Thailand is on a home-craft basis rather than on a factory basis. Tailoring and the manufacturing of soap, ice, furniture, matches, cloth, pottery, and tinware all add value to total production. Value added to product by the slaughter of swine and by milling of rice are among the most important activities in Thailand.

Industrial activity in Thailand is low even when compared with other countries in Asia. Japan uses 32 times more energy (coal equivalent) on a per capita basis than Thailand; the Philippines and India use three times as much.[8]

External trade is of prime importance to Thailand because most manufactured goods must be imported. To obtain the foreign exchange to pay for necessary imports, Thailand must rely largely on the sale of the four primary products listed below.[9]

Thailand is the second largest exporter of rice in the world,[10] relying heavily on Japan, Hong Kong, Singapore, and

[6] Kamol Odd Janlekha, *A Study of the Economy of a Rice-Growing Village in Central Thailand*, unpublished PhD thesis (Ithaca, New York: Cornell University Library, 1955), p. 294.

[7] *Economic Survey of Asia and the Far East 1954*, United Nations, Bangkok, Thailand, Vol. 4, February 1955, pp. 175-81.

[8] *Ibid.*, p. 47.

[9] *Agricultural Development of Thailand*, EGAFE/FAO, Agricultural Division Economic Commission for Asia and the Far East, Bangkok, Thailand, March 1955, p. 14.

[10] From 1950 until 1954 Thailand was the largest exporter of rice in the world. Since 1954 Thailand's exports of rice are exceeded only by those of Burma.

THAILAND'S PRINCIPAL EXPORTS, 1950-53 AVERAGE

Item	Percent of total value
Rice	56
Rubber	20
Tin ore	6
Teak	3
Others[1]	15
	100

[1] Includes dry chile, green beans, hides, salt, sticklac, tapioca, wolfram ore, and vegetable oils.

Malaya for markets. About one-third of all the rice produced in Thailand is exported. Rubber and tin are produced mainly for export, and about 20 percent of the total teak output is for the foreign market.

In Thailand much labor, the most abundant resource, is combined with relatively little capital in a setting which is largely agricultural. Technical knowledge of farming in Thailand is not widespread. Entrepreneurship in agriculture is concerned simply with employing the same production practices as have been carried on for hundreds of years. On the industrial side, a lack of experienced entrepreneurship and of know-how has retarded development. Capital for investment is scarce throughout the Kingdom. Power development has been slow because of a scarcity of capital and lack of potential.[11]

A hasty comparison of resource use in the United States with that of Thailand can easily lead to the ill-founded conclusion that Thailand makes inefficient use of its resources. Because income, savings, and output per person in Thailand are low in comparison with those in the United States does not necessarily mean inefficiency. Thailand does not have the same resources with which to work as do the people of the United States. Thailand lacks the important ingredients of capital, technical know-how, and power production so necessary for economic development.

Resource utilization in Thailand must be viewed in terms of possible alternative within the country and not by comparison with other countries. No two countries have exactly the same combination of resources, so a direct comparison of use is illogical. Neither are resources in Thailand and the United States employed in similar settings. The output and level of living in a highly industrial country, however, may serve as a guide to what may be accomplished over a period of time with a given combination of resources and technical know-how.

Industrialization is of recent origin in Thailand and still of minor importance. The few commercial industries that exist, both public and private, are small. Industrial development requires capital. As per capita income was estimated to be less than $100 in 1952,[12] and probably is not much higher now, capital accumulation is bound to be slow in Thailand because no successful method has been devised for mobilizing even the meager resources of small savers. Most people keep their savings in jewelry or cash. More must be done to encourage farmers and others to use the facilities of savings banks and coooperative credit societies. Furthermore, there is no established bond market. The government sells its bonds to the Bank of Thailand, a procedure

[11] Thailand has no known oil or high grade coal deposits. Lignite coal can help to solve the power shortage in Thailand in only an insignificant way because the output averages only about 60 tons per day and it is not likely this output will increase materially in the next several years. There is a moderate hydroelectric potential in places but development will take millions of dollars and much time.

[12] United Nations report, *op. cit.*, p. 199.

which involves the direct creation of money and is, therefore, inflationary.[13]

Another source of capital is external borrowing. Thailand already has borrowed from the International Bank for Reconstruction and Development to develop irrigation facilities, to expand the railway system, and to dredge rivers. Borrowing from the International Bank has proved to be desirable because in addition to providing capital funds on reasonable terms and interest rates, much entrepreneurial skill is also furnished.

Finally, Thailand may obtain capital by encouraging foreign investment. This could become a substantial factor in increasing employment and raising the level of living. The new Industrial Promotion Act which became effective in October 1954 seeks to encourage foreign investment in industrial enterprises. In November 1955 the government decided to ask experts from the International Bank for Reconstruction and Development to survey Thailand's resources. The primary purpose of this survey was to provide foreign investors with accurate information concerning industrial possibilities in Thailand. Nevertheless, foreign capital will move into Thailand slowly. First of all, there must be a definite policy as to import duties on raw materials and machinery, and as to taxes, rates of profit, and transfer of funds. Second, foreign capital will be reluctant to enter Thailand even though encouraged to do so because the Thai market for most goods is very narrow. Only a small proportion of the people have more than a bare subsistence income. Finally, it is well known that Thailand, a small nation, is located near some larger unfriendly countries. This may be an important factor in retarding the flow of capital into the country, particularly when there are many other places where foreigners may invest funds.

In view of scarce capital resources in Thailand, the marginal capital/output ratio should be as low as possible. An overall requirement of a capital/output ratio of 2.5 for Thailand and other countries in southeast Asia is estimated. The ratio for cottage and small-scale industries is less than 2.5, but the capital requirements of related activities, such as transport and power development required to service the various industries, significantly increase capital needs.

Even with a low capital/output ratio, there is no hope of obtaining all of the required capital funds through savings. Excluding mainland China and Japan, the gap between minimum investment needs and domestic savings is at least 60 percent for the countries of southeast Asia.[14] So, a substantial inflow of funds through foreign investment and borrowing is essential if there is to be an expanding rather than a stagnant economy.

Only during the last few years has there been a need for technically trained personnel and for management other than individual proprietorship. Engineers now are being trained in Thailand and abroad in increasing numbers, and at least one additional engineering school is in the planning stage. There is no easy and quick way to increase managerial capacity. Management achieves proficiency through both training and experience with experience in the native setting an essential. Much can be said for foreign investment since it is usually accompanied by foreign management. Local people then learn from the imported management. The cement industry in Thailand is an example of a

[13] As lines of communication with the people improve, more and more attention needs to be given to encouraging savings for deposit in banks and cooperative credit societies, or for purchasing government bonds. So far, most capital investment has been financed out of current revenue, external borrowing, and United States military and technical assistance.

[14] United Nations Report, *op. cit.*, pp. xiii-xv.

firm that employs foreign management which has developed some excellent ability among its local personnel.

Modern industrial enterprises must have power. Until 1952 Thailand had no hydroelectric plants. The lignite coal fields opened in 1954 may provide a little fuel for power generation. In planning new industrial plants technicians also have considered the use of charcoal which is plentiful but not very efficient in terms of other fuels. Some additional hydroelectric power will be available after 1958 but not nearly enough to meet potential industrial demands. Thailand's best hope may be in developing low-cost nuclear power stations.

Cottage and small-scale industries will and should be maintained in Thailand for a long time. Western technology based on labor-saving machinery is not generally suited to Thailand. What is needed are hand tools, small machines, and equipment to suit a country with scarce capital and abundant labor. Only in a few cases does the factory system seem warranted in the present economic setting.

Because nearly every farmer in Thailand has a small income, the most basic wants are food, clothing, and shelter. If economies of scale are to prevail in a few industries, the products to be manufactured within the country should be within the economic reach of most of the people.[15] The best possibilities are likely to be basic clothing and food. The importation of yarn and cloth is by far the most important of the country. Much revenue is derived from the importation of these items although the duty has been relatively low. The wide-scale development of yarn and cloth manufacture in the country would likely necessitate the imposition of other taxes to compensate, in part or whole, for the loss in duty revenue. If plants were operated with reasonable efficiency there would still be some comparative advantage in producing these items in Thailand compared to importing them.

As to food, much can be done to add value to primary products by processing. The milling and handling of rice for both the foreign and domestic markets can be improved. Many swine are already produced in Thailand, and more can be. Preliminary steps are being taken to establish a modern processing plant where bacon and ham may be cured on a commercial basis.

In Thailand's agriculture the proportion of capital to labor has not changed appreciably for generations. Farmers are deeply entrenched in traditional agricultural pursuits. Ideas that have prevailed for a long time have become practically imperishable.[16] Nonetheless, concurrent with an industrial development to siphon off some of the plentiful labor supply, farmers generally must adapt themselves to new and better things. As each successive generation receives more and more education, they will tend to be more receptive to new ideas—the people will become more curious and lose their apathy.[17] At the same time some very tangible incentives must be offered the rural people in order to break the existing pattern. The government, through its universities, extension service, and various ministries serving agriculture, needs to show farmers how to increase

[15] With the possible exception of such items as fish oil, rubber goods, and soap preparations, it is not likely that Thailand will export manufactured items in much quantity for a long time. Production to satisfy part of the home market is the best possibility in the years immediately ahead. Of course if some goods can be manufactured for the export market also, so much the better.

[16] In several respects Thailand has a fairly sound agriculture when compared with some other countries. Most farmers own their land, have few debts, and fragmentation is a minor problem under existing cultural practices.

[17] C. W. Chang, *The Rural Community Development Movement in Asia and the Far East* (Bangkok, Thailand: Regional Office, Food and Agriculture Organization of the United States, 1955)

their net incomes by using better seed, fertilizer, proper irrigation practices, labor-saving equipment whenever practicable, and improved cultural practices. Knowledge must be made to work for the farm people of Thailand.

To gain acceptance, so-called new ideas must contain something of the old. Most human beings are inclined to accept only those things they understand. When something familiar is found in a proposal, curiosity may be aroused sufficiently to achieve a fairly comprehensive understanding. Otherwise there is no point of departure in trying to grasp a completely new proposal. People may claim to be readily receptive to new ideas, but most tend to put up some resistance. Some corn-belt farmers in the United States needed 15 years to discover that hybrid corn increased yields per acre to the point where net incomes were enhanced significantly. The Thai are no different.

Up to now most of the people of Thailand have felt that poverty is inescapable. Education has shown some of these people that a chance for a better life may exist.[18] Much has been done in Thailand in a relatively short period of time to raise educational standards and to provide instruction. Education is compulsory through the fourth grade or to 14 years of age with instruction available in even remote areas of the Kingdom. More advanced instruction is being provided as rapidly as additional funds and teaching personnel permit. Although it is essential, formal education by itself does not assure economic development. Education provides the climate in which it is possible to stimulate entrepreneurs. It also provides a continuous stream of information concerning the latest production techniques, prices, markets, and government policies.

[18] Janlekha, *op. cit.*, p. 26.

Only in exceptional cases is it possible to lift techniques and ideas out of the United States and drop them successfully into a foreign country. What Thailand must do, and in fact is doing, is to formulate objectives and goals that can be realized within the existing milieu described in the preceding section. Goals in Thailand that would involve the use of much capital and highly technical entrepreneurship cannot be realized.

Another important impediment to progress is the fact that technicians, farmers, and others in Thailand and elsewhere think they are doing reasonably satisfactory work and within their frame of reference possibly most of them are. If they thought otherwise, they would change. They have a sense of security in thinking and doing the same things year after year. As a result of this stability in the economic arena, enterpreneurs can predict the outcome of production and marketing processes fairly well after many years of doing the same thing. Everyone finds it difficult to break with tradition. Yet only by changing customs, habits, and methods can there be any real progress.

A number of technical problems also impede economic development in Thailand. It will take a long time in a favorable setting to establish a satisfactory network of communication and transport that reaches all of the people, though much development in transportation already has taken place. The data available indicate the road mileage increased by about four times in the last 20 years.[19]

Postal and telegraph service reaches most parts of the Kingdom but only a few telephone lines extend outside Bangkok. The number of radios has increased greatly in the last few years but they are still far too expensive for the average

[19] *Statistical Year Book Thailand, 1952,* National Economic Council, New Series. Vol. I, Bangkok, Thailand, p. 189.

farmer. Bangkok has several radio stations but other parts of the Kingdom have none. The newly organized Extension Service ultimately should become an important vehicle in the dissemination of information to farm people. It is limited in scope at present because of inadequate funds, personnel, and research results.

Capital accumulation is a slow process. To increase per capita income by 2 percent per annum in Asia and the Far East with its population of 1,200 million people would require an initial capital investment of $10,800 million per year. The amount of capital required would increase in subsequent years as population and national income increase. Yet with a constant annual increase of net income per person of 2 percent, it would take 35 years to double the income of the people.[20] It is unlikely that capital will be accumulated in the amounts indicated to bring about an increase of 2 percent per annum in per capita income. If this is so, it will take longer than 35 years to double per capita income.

Of course, to build a body of research results which may be disseminated to farmers and others takes a long time. Research projects dealing with seed, crop, and livestock improvement usually must be carried on over a period of several years. Such research is of a continuing nature. Furthermore, to push research results into the hands of farmers takes years, even under favorable circumstances. A country can not jump overnight from the production of primary products to a modern economy based on industrialization and outside markets; it has to grow into it gradually.[21]

[20] United Nations Report, *op. cit.*, p. xiv.

[21] Stanley Andrews, *World Agricultural Situation and Its Implications for Economic Mobilization* (Washington, D. C.: Industrial College of the Armed Forces, 1953-1954), pp.1-12.

Conclusions

Much labor and relatively little capital are used in Thailand agriculture, industry, and the trades. Most of the people work on the land though unemployed a good part of the year, simply because there are few jobs elsewhere. Firms are small, and use few tools and hardly any complex machines because of a shortage of capital, of skilled entrepreneurship, and of technical know-how. Industrial plants also are small and few because power is exceedingly scarce.

Capital accumulation is bound to be slow because current consumption absorbs current output. External borrowings provide an important source of capital and speeds accumulation but in no miraculous way. Because the gap between investment needs and savings is so great, foreign capital is essential to economic development in Thailand. Skilled entrepreneurship and know-how must be trained concurrent with development. Power development, improved communication, and transport, so essential to greater industrialization and to improvement in agriculture, all require heavy outlays of capital. Thus, much manufacturing will continue to be on a home-craft basis for a long time and in small shops with hand tools.

If the progress of the past few years is to continue, or be accelerated, the people as a whole must understand what is involved. Only through education can the people of Thailand be stimulated to new and better things. Even then some very tangible incentives may be needed to break the traditional patterns, especially in agriculture. However, once the people can see for themselves the value of making changes, subsequent changes may come more easily.

Urban Pressures on California Land

By HOWARD F. GREGOR*

"We stand today in the midst of a gigantic and pervasive revolution, the urbanization of the world. This revolution has not yet spent its full force. It is in a phase of rapid upswing."[1]

THE WORDS of Harris have special application to land use history in California for the economic development of the state has been a series of urban-induced revolutions. The earlier agricultural shifts were attuned to the growing urban markets of the East while the most important current change is the growing urbanization of California land itself. California land has long been subjected to urban inroads. It has been only since World War II, however, that increasing loss of agricultural land to urban use has occasioned public and official alarm.[2] Such a diminution is particularly serious in California because of (1) the limited amount of agricultural land (only one-fifth of the total state area), and (2) its high national ranking as a provider of specialty crops, due in great part to peculiarly favorable climatic conditions. The motives for land urbanization in California are numerous and varied, involving demographic, sociologic, historical, economic, spatial, and political aspects.

Population Growth

Statistics on the gains in California's population and corresponding changes in crop acreages are the most direct evidences of the urban-rural resource conflict. The population increase since 1950 had by the end of 1956 already closely approached the growth experienced in the entire preceding decade. Conservative state estimates anticipated that the 1940-50 expansion would be easily surpassed by 1960. The estimated population of the state in 1956 was approximately 13,600,000; over 15,500,000 were expected for 1960.

Agricultural statistics for the state as a whole show no accompanying decrease in agricultural land. But the local picture is quite different. Two-thirds of the state population lives in the two large urban complexes of Los Angeles and the San Francisco Bay Area. And this concentration is intensifying.[3] It is in these coastal areas where the total amount, and trend, of agricultural land losses have been impressive. About 25 percent of the land in Los Angeles County (excluding the largely unproductive mountain and desert areas) shifted from agricultural to urban use in the 1940-54 period, while the population of the same area doubled from 2,650,000 to almost 5,000,000. By 1975, it is expected that a total of 58 percent of the agricultural land in this area will have been taken over by urban uses.[4] Similar changes, but not involving quite as much land, have taken place in the Bay Area, particularly in the fertile Santa Clara Valley. Compensatory production has been provided by

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[1] Chauncy D. Harris, "The Pressure of Residential-Industrial Land Use," *Man's Role in Changing the Face of the Earth*, ed. by William L. Thomas, Jr. (Chicago: The University of Chicago Press, 1956), Part II, 881.

[2] Implications of such losses were already foreseen by many individuals prior to this period. See, e.g., the statement of H. F. Raup in "Land-Use and Water-Supply Problems in Southern California: Market Gardens of the Palos Verdes Hills," *Geographical Review*, April 1936, 269.

[3] While the lure of California's mild climate is acknowledged as a major factor in the massive population increase of the state (See Edward L. Ullman, "Amenities as a Factor in Regional Growth," *Geographical Review*, January, 1954, 119-32), the economic attraction of more job opportunities continues to increase the population differential between the coastal conurbations and the more sparsely populated interior lands of California.

[4] Los Angeles County Regional Planning Commission, *Master Plan of Land Use, Inventory and Classification*, cited by Los Angeles County Chamber of Commerce, *1925-1954 Crop Acreage Trends for Los Angeles County and Southern California* (Los Angeles: Los Angeles County Board of Supervisors, 1955), p. 8.

intensification in these same coastal and other sections of the state, a few additions of new crop land, and augmented importation from other areas in the country. It is estimated that California is now losing 100,000 to 500,000 acres of productive land annually.[5]

Ultimately more significant than the actual loss of farm land as a result of population expansion has been the overwhelming urban character of that increase. This feature applies not only to the more recent decades but also to the very beginning stages of California's existence as a state. Unlike the typical western settler, not many of the early immigrants were farmers. "The greater number of them came from the stores, counting houses, shops, and offices of their homes in the eastern states."[6] Thus, unlike the average American farm community, town or colony settlement often preceded intensive agricultural development in an area, especially in southern California. By 1870 California was already among the ten most urban states in the country. McWilliams notes that from 1860 to 1940 the urban population of the state increased sixty times in contrast to only a seven-fold increase of the rural population.[7] Accentuating this disparity were the early mechanization of California agriculture—with accompanying high operating costs—and the long retention of much good agricultural land in large holdings.[8] Both of these factors discouraged intensive participation in the agriculture of the state by the incoming arrivals. On the other hand, it is obvious that the majority of the Californians would never have been able to subsist except on an urban (i.e., industrial) economy, on the basis of both numbers and temperament. Today, only about six percent of the California population is engaged in agricultural operations.[9] Economic and sociologic reasons thus contribute to the fact that a large segment of the state's populations shows apathy, at best, over the problems of diminishing agricultural land.

"*Industrial*" *Agriculture*

This urban psychology applies only slightly less to the agricultural population. The vast mass of field workers, still indispensable to California agriculture despite expanding mechanization, have no deep cultural roots in California land. They own little of it and regard the verbal or signed, seasonal or yearly, labor contract as their principal goal. Even this economic link is tenuous. A portion of the typical agricultural field hand's yearly work schedule usually has to do with labor *off* the land.[10] This is particularly true of those laborers who are naturalized or native Mexican-Americans (the dominant field labor group) and have established permanent homes in the state. Anglicization of second and third generations of these particular rural groups has also fostered a keen desire to leave agriculture entirely and take an increasing share of the expanding economic opportunities in California cities.

Urban leanings are also strong among the remaining two components of agricultural population in the state, the small tenant-or owner-operator and the large tenant- or owner-operator. While the

[5] J. Earl Coke, "The Problem," (Paper read at the Statewide Conference on Agricultural Zoning, California State Chamber of Commerce, San Francisco, January 27, 1956).

[6] Carey McWilliams, *Southern California Country* (New York: Duell, Sloan & Pierce, 1946), p. 151.

[7] *Ibid.*, *California, The Great Exception* (New York: Current Books, 1949), p. 82.

[8] E.g., the extensive Miller-Lux properties in the San Joaquin Valley during the late 1800's.

[9] Coke, *op. cit.*

[10] Arthur Raper notes that of the seven major farming-type regions in the United States the West is second in percentage of farm operators who did 100 days or more off-farm work. California is the most important single unit of this area. Carl Taylor, *et al.*, "Comparisons and Contrasts of Major Type-Farming Areas," *Rural Life in the United States*, (New York: Alfred A. Knopf, 1949), 27, Part IV, 466.

chances for a strong "feel" for the land would seem especially good among the small operators, the actual situation is otherwise. Walter Goldschmidt, in his classic on rural sociology in California, states:

"No statistics can give a full appreciation of the importance of industrialized operations because even the modest grower uses methods, organizes his operations, and maintains attitudes established by the large grower [the large tenant- and owner-operator]. The family farmer must compete with these large enterprises and frequently is dependent upon one of them for financing, processing, or marketing his goods. He finds himself a part of social attitudes, ethics, and social values which he can rarely escape."[11]

And what are these social attitudes, ethics, and social values? Foremost is the strong pecuniary approach to farming. Cash returns are foremost in every phase of the farm process. The sharing of implements and farm labor, common to a majority of American agricultural regions, is exotic in California rural areas. A cash settlement is the solution, with practically all share arrangements being handled on a rental basis. The growing importance of the independent "equipment operator" working on a contract basis is a good example in point. Land value computations are so concise that kitchen gardens, and occasionally even lawns, are sacrificed to cropping. The "incongruity" of an intensive agricultural landscape and the steadily diminishing crop lands can be explained in part by this almost exclusive emphasis on monetary value. As long as an increasingly productive farming economy brought in the most profits, greater attention to increased agricultural production was the rule. Increasing competition of urbanism and its economic attractions are now seriously challenging agriculture on this very same basis of cash value, and the question arises as to whether only this *one* index of value can be applied to an area of multiple land uses and still provide for an economically *and* socially equitable land apportionment among the various demands on the land. For lack of any other socially-accepted criteria, both small and large owner-operators in California have to consider cash value as the ultimate determinant of land-use types, even to complete abandonment of the land, if necessary.

Absenteeism and large landholdings further contribute to the dominant cash-value attitude of the large tenant- and owner-operators. Managerial systems of tenancy are becoming increasingly popular in California. Managers operate the "ranches" for other reasons, or for business concerns—often investment companies—which are sometimes situated in towns or cities not even located in the particular farming area.[12] Thus cash, often on an "as-much-as-possible-and-as-soon-as-possible" basis, becomes the only strong link among the people involved in the farming of the area. Large holdings provide the owner-operators with a cushion against many an economic reversal, including loss of farm land. Land which has been utilized extensively can often be converted into more intensive use so as to compensate for acreage losses elsewhere. Undoubtedly such a buffer further reduces the chance of a more numerous and united rural opposition to land losses, particularly when it is noted that, in the early 1940's, 66 percent of the total farm acreage in California and 35 percent of all the land under cultivation in the state was on farms of 1,000 acres or more.[13] Also, this proportion is ex-

[11] Walter Goldschmidt, *As You Sow* (New York: Harcourt-Brace, 1947), p. 13.

[12] Howard F. Gregor, "A Sample Study of the California Ranch," *Annals of the Association of American Geographers*, December 1951, 292.

[13] Goldschmidt, *As You Sow*, *op. cit.*, p. 13.

panding. The economy of California is still a highly speculative one. Its high level of development does not necessarily imply a mature adjustment of man to the land.

Certainly, heavy stress on profit in agriculture is not peculiar to California. It is rather one of degree. But there are other aspects of the rural sociological picture in California which accentuate this difference in degree and again point up the strong urban character of the California farm population—with its overwhelming stress on profit and exploitation to the increasing detriment of the land resource. Heterogeneity of the farm population and an accompanying great diversity of social action shows a strong similarity to the typical urban community. "Horizontal" integration among the farm classes (e.g., field laborers) subsitutes for the "vertical" integration which is more typical of eastern farming communities. Even this grouping is a coarse one, for social fragmentation proceeds even further along specialty lines: "The 'lifeways of a potato grower' in California are unlike those of a grape grower, and much the same specialization is to be found among farm laborers."[14] Thus is added still another factor contributing to the inability of the rural population to effectively organize its opinions and actions.

Other urban, or "industrial," characteristics of the California farming scene may be observed. Both farm and small town reflect the "hierarchy of elites" to be found in urban centers.[15] Rural slums are widely distributed, being particularly evident in the "skid rows" of such agricultural centers as Sacramento and Stockton. Morning and evening commuter flows of farm laborers swell the traffic between field and city.[16] Farm families are generally small and have a great diversity of backgrounds.

Finally, the California rural population shares with the state's urban groups (and other western specialty-crop areas)[17] a frontier psychology in which willingness to abandon old ways and adopt new ones is uppermost.[18] Such an attitude implies not only a bent toward economic exploitation but an accepted way of life. Optimism and freedom from tradition have contributed much to our technological progress. It is also certain, however, that this same cultural attitude has contributed toward a too narrow economic view of the value of agricultural land, especially when a choice between urban and agricultural land use priority must be made.

Building "Out"

While an unprecedented population increase and a dominant urban psychology are more underlying causes of the urbanization of California land, the process of building "out" rather than "up" is a more immediate reason. Urban sprawl characterizes all rapidly expanding American metropolises but nowhere is it as intense in relation to the amount of population increase as it is in California. The reasons for this are several.

Historical precedent, strange as it may seem for a state of comparatively youthful economic development, is an important factor. Contrary to popular belief, early

[14] *Ibid.*, cited by McWilliams, *California, The Great Exception, op. cit.*, p. 102.

[15] A hierarchy of towns, graded according to the degree of concentration of centralized services. First espoused by Walther Christaller, *Die Zentralen Orte Suddeutschlands* (Jena, Germany: Fischer, 1933). A brief description of the theory is given by Robert E. Dickinson in *City Region and Regionalism* (New York: Oxford University Press, 1947), pp. 30-35.

[16] Gregor, "Agricultural Shifts in the Ventura Lowland of California," *Economic Geography*, October 1953, page 356.

[17] For delineation of these areas, see the map, "Regionalized Types of Farming in the United States," in Arthur F. Raper and Carl C. Taylor, "Rural Culture," *Rural Life in the United States, op. cit.*, 19, Part IV, 340.

[18] McWilliams advocates this idea as one of the major explanations for California's rapid rise in technological and specialized agriculture (*California, The Great Exception*, p. 88).

ordinances limiting the height of buildings because of fear of earthquakes were not the only reason for the excessive emphasis on horizontal, rather than vertical, expansion. The origin area of the majority of Californians was, even before the turn of the century, the Middle West. These people "wanted homes, not tenements, and homes meant villages."[19] By 1900 the Los Angeles area had already embarked on this horizontal movement in earnest. Thus, before the rural-urban fringe had begun to be seriously considered by planners, land economists, and urban geographers as a primary element in urbanization, the fringe had already been a reality in the Los Angeles Basin for several decades. Unlike many other urban margins, however, the basic development of this one could not be analyzed largely on the basis of economic drives[20] for there was little major industry in the area at the time. Economically speaking, the oft-quoted jibe at Los Angeles, "a collection of suburbs looking for a city" applies more to the *post*-1920 period. Prior to that time the numerous suburbs in the Los Angeles basin did comparatively little "looking" for the urban core. Their origins, while more immediately economic, were more basically sociologic and, in both cases, to a great degree independent of any influences from Los Angeles. Only after 1920, and especially after 1940, did the rural-urban fringe of the Los Angeles area and the main city begin to acquire those closer economic relationships which are typical of such complexes today. This early building "out" pattern occurred in other California urban centers as well, although nowhere approaching the degree of coastal southern California.

One can turn again to historical background for a further explanation of this precocious horizontal expansion. The more recent, and largest, population migrations to California have taken place in an age of automobiles. Economic development in the state was thus much more conditioned by the passenger car[21] and truck[22] than was the case in the East. With the rapid increase in automobiles came major expansions of the highway network which, in turn, facilitated further rapid horizontal urbanization. The modern and complex freeway system of the Los Angeles area has long been held as the principal evidence of this reciprocal relationship in California. However, the role of the bridges and related urban growth in the San Francisco Bay Area is also a striking example of how the automobile has hastened the decline of agricultural land in the state. Unlike the Los Angeles region, the Bay Area's urban growth has faced more topographic barriers, the most formidable being water. Not until 1927 were any of the several intersecting bays connected by bridges. Then, within ten years, five crossings were constructed, enabling the increasingly cramped popu-

[19] McWilliams, *Southern California Country*, *op. cit.*, p. 159.

[20] E.g., the "sector" theory of R. M. Hurd, *Principles of City Land Values*, 2nd ed. (New York: The Record and Guide, 1905, 1924), the "concentric circle" theory of E. W. Burgess, R. E. Park, and R. D. McKenzie, *The City* (Chicago: The University of Chicago Press, 1925), and the concept of site competition as described by R. U. Ratcliff in *Urban Land Economics* (New York: McGraw-Hill Book Company, 1949). There seems little doubt, in fact, that *any* other major rural-urban fringe in the United States first developed with as little regard to economic motives as that of the Los Angeles area.

[21] California has the highest per capita auto registration in the country.

[22] Both Los Angeles and San Francisco wholesale fresh fruit and vegetable markets currently receive over 80 percent of their produce by truck, in contrast to an average 25 to 50 percent for the markets in New York, Chicago, and Philadelphia (United States and California Departments of Agriculture, Federal-State Market News Service, *Unloads of Fresh Fuits and Vegetables at Los Angeles, 1952*, Los Angeles, 1953, Preface.). Trucks have also contributed to the spread of industrialization—and urbanization—over California land. Alexander Melamid observes that truck transportation makes it economically feasible for industries to disperse within the radius of overnight trucking range of a major urban center, where other factors have made such dispersal economically attractive. "Economic Aspects of Industrial Dispersal," *Social Research*, Autumn, 1956, p. 319. Los Angeles and the Bay Area are just within overnight trucking distance from each other.

lations of the Bay Area to spill out into more distant reaches, several of which had previously been comparatively sparsely populated. Also underlying the significance of the automobile is that, of the eight bridges currently spanning the various water arms, only three have provisions for railroads.[23]

It was the more recent World War II period, however, rather than these earlier eras which brought the greatest impetus to the California penchant of building "out" rather than "up." Parsons observes that the assembly line, mass-production building of "monotonous miles of 'tract' houses of American suburbia is perhaps as much a California creation as any of the architectural fads which spanned across the nation from the West."[24] Many government contracts and materials priorities were accorded builders during World War II so as to take care of the rapidly growing military and civilian populations in the state. Civilian incomes also generally increased at this time, thus enhancing the home market. A mild climate permitted year-round outdoor construction and encouraged the exclusion of basements. Friendly building codes and loosely organized labor unions further encouraged intensive building activity. Such construction programs, in conjunction with the ease of the automobile and regional origins of migrants, have made the single-family home a more ubiquitous feature of the California landscape than in most other comparably urbanized regions of the nation. While multi-storied apartments are now being constructed in greater numbers (primarily in the older and more congested areas of the Bay and Los Angeles areas[25]), the dream of a California "rambler" or "ranch"[26] often matches the lure of a mild climate for the prospective Californian. The "rambler" or "ranch" type of house form goes back in tradition to the adobe of the Spanish settlers. Its greatest influence, however, has been since World War II. Although nowhere nearly as pretentious as the more luxurious "ranch" homes, those of tract construction are similar in their emphasis on single-story living. Combined with the comparative recency of large California urban population increases, the popularity of the single-family, single-story home has helped bring about one of the most intensive horizontal urbanizations of the land in the country within the last decade. Post-World War II urban expansion on the peripheries of California cities has not resulted solely from natural increases or immigration. As in the case of other American metropolitan centers, significant population migrations from the central area of the city to the margins are taking place in Los Angeles, San Francisco, and Oakland.

Spatial Patterns of Urbanization

As emphasis on building "out" has intensified the pressures of large popula-

[23] For a more detailed account of the significance of the bridges to Bay Area transportation development, see Fritz Bartz, "San Francisco-Oakland Metropolitan Area: Strukturwandlungen eines US-Amerikanischen Grossstadtkomplexes," *Bonner Geographische Abhandlungen*, January 1954, 20-21.

[24] J. J. Parsons, "Home-Building and Furnishing Industries," *California and the Southwest*, Clifford Zierer, ed. (New York: John Wiley and Sons, Inc., 1956), 25, Part 2-D, 267. Howard Nelson provides an interesting description of these mass-production home building techniques in the Los Angeles area in "Die Binnenwanderung in den U.S.A. am Beispiel Kaliforniens," *Die Erde*, Part 2, 1953, 118-19.

[25] At this writing the Los Angeles Board of Supervisors was considering the repeal of the story-limitation on buildings so as to foster an urban appearance "more befitting the metropolitan character of Los Angeles."

[26] The term *ranch* is a confusing one in California. It is used officially and unofficially to apply to all farm units, be they 20,000 acres or two acres. While the latter type of "ranch" is the smallest of California ranch types, it is expanding more rapidly than any other near the urban areas. Such a type is most often owned by a city dweller who wishes to enjoy the values of rural surroundings while at the same time being not too far away from his city job and conveniences of an urban area. A few acres of fruit often provide a small auxiliary income. H. F. Gregor, "A Sample Study of the California Ranch," *Annals of the Association of American Geographers*, *op. cit.*, 298-99.

tion increases on the land, so have the various *spatial* patterns of urbanization exaggerated the effects of the building "out" process. An overall view of the principal California lowlands shows urbanization making its greatest gains in those areas which provide the most favorable physical environment for agriculture—central and southern coastal California, Sacramento Valley, eastern San Joaquin Valley. Only in the rich agricultural Imperial Valley, completely dependent on imported Colorado River water and faced with a major drainage problem, has there been little urban expansion to date. The Los Angeles and the Bay Area regions are the most critical areas, as here the ratio of urban to agricultural land is extremely large. It is significant that the two largest population concentrations in the state are in areas which have a relatively small amount of "flat" land, whereas the much smaller urban foci locate in the spacious Central Valley and southeastern desert.

But most major urban centers of California are alike in their choosing the best agricultural land of these lowlands for sites. Land use capability maps reveal that in almost all cases a growing town or city is located on "Class I" soils, the best in the state. If "Class II" soils, only slightly less favorable for agriculture, are included, even more urban communities are involved.[27] This is logical because many of California's towns and cities originated as service centers for agricultural communities. Ease of building and central location, as well as just plain psychological tendencies toward settling in the most level areas (e.g., Middle Western backgrounds), further contributed to these initial absorptions of prime rural land. Subsequent population "waves" then enabled these urban areas to expand still farther out over the best land of the state. Today, for example, 80 percent of the Los Angeles metropolitan area covers Class I and II soils,[28] while 70 percent of just the Class I soils in the Santa Clara Valley are already in urban use.[29] This becomes even more impressive when it is noted that Class I and II soils occupy only 6 percent[30] of the total state area and just 10 percent of all of its cropland.

Actual urban displacement of agricultural land, however, is still not as telling as the *potential* for future, and greater, changes. That expanding urban areas prejudice agricultural land use beyond the area of buildup is well known.[31] Land speculation by both the farmer and the real estate agent is one of the more important and immediate reasons for the development of this "zone of urban influence" in California. The common practice of the assessor in raising rates of farm land adjacent to new urban areas to the same urban rate is another principal cause. In both cases farming activity very often decreases in intensity or stops completely. Urban competition for water plays a part also. Average home consumption now is greater than farm use on an acre-to-acre basis in the swiftly growing Bay Area, Los Angeles, and San Diego metropolitan centers. Close urban proximity to farm lands has brought on further conflicts between urban and rural groups, often

[27] Class I soils ("Very good cultivable land") and Class II soils ("Good cultivable land with minor limitations in use") refer to the eight "land capability" categories devised by Leonard R. Wohletz and Edward F. Dolder in *Know California's Land* (Sacramento: State Printing Office, 1952), p. 5.

[28] J. Herbert Snyder, "Is Agricultural Zoning Necessary Now?" Paper read at the Statewide Conference on Agricultural Zoning, California State Chamber of Commerce, San Francisco, January 27, 1956.

[29] "Santa Clara County—Is Agriculture Being Threatened?" *Western Canner and Packer*. August 1955.

[30] Wohletz and Dolder, *op. cit.*, pp. 10-11.

[31] E.g., the excellent description of the effect of speculative use of land on agriculture in "What is Happening to Agriculture in Northwestern Indiana?" Purdue University Agricultural Experiment Station Bulletin 321, 1928, cited by Edgar M. Hoover, *The Location of Economic Activity* (New York: McGraw-Hill Book Co., 1948), pp. 101-102.

resolved ultimately in favor of the former. Damaging of crops by children and such farming "nuisances" as fertilizer odors are but a few of these additional sources of tension.

With such effects of new urban districts on adjacent farm land, it becomes readily apparent that the more numerous and dispersed the expanding urban areas become, the more land urbanization will eventually absorb and the faster the rate of that urbanization. Engelbert lists seven spatial patterns of urbanization which are generally taking place within a fifty-mile radius of California cities: peripheral expansion of the urban core; urban encirclement, resulting in agricultural islands; "leap-frogging;" industrial dispersal; planned decentralization (military projects, greenbelt communities, etc.); radial expansion along major avenues of traffic; and diffusion, the growth of widely dispersed suburban tracts.[32] It is the last two which have contributed most, both directly *and* indirectly, to the loss of agricultural land in the state. The rapidly expanding road network, including the "freeway" system, has in the Los Angeles and Bay Areas provided perimetric sections with indirect and speedy access to the larger urban centers —the best source of employment opportunities and, hitherto, too distant from the smaller communities. The result has been a proliferation of tract developments along such routes.[33]

An even more efficient urbanizing agent has been the diffusion of small groups of homes, or "block tracts" (Fig. 1). They are more numerous and widely distributed than the strongly urbanized highway strips. *Fragmentation*[34] might be a better term here from the viewpoint of both the effect of urbanization on agricultural land and the complete lack of planning implied by these "urban islands." Belser gives a dramatic example of the implications of fragmentation for future land use when he notes that while urbanization had already used up 8 percent of the remaining 100 square miles of agricultural land in the northern Santa Clara Valley (the majority of the valley) between 1950 and 1954, the scattered distribution of this 8 percent was such:

". . . . that if one sat down with a map of Santa Clara County and laid out a zone of influence of ½ mile around each subdivision and each city, the entire northwesterly section would be covered. This, of course, means that approximately 100 square miles of developable land is prejudiced in this manner from the standpoint of efficiency of operation [e.g., decline of farming efficiency, disruption of irrigation and drainage systems] and adverse tax liability."[35]

The combination of widely scattered subdivisioning and rapid land urbanization applies even more to the metropolitan Los Angeles region (Los Angeles and Orange counties).

TABLE I—RESIDENTIAL SUBDIVISIONS, 1950-51—1954-55*

County	Acreage	Subdivisions	"Dispersal-Intensity" Index[1]
Los Angeles	56,886	3,966	.0703
San Bernardino	25,057	841	.0336
San Diego	19,067	777	.0408
Orange	12,687	953	.0748
Contra Costa	10,078	516	.0511
Santa Clara	10,000	700	.0700
Riverside	7,818	411	.0524
Sacramento	7,776	499	.0642
San Mateo	6,210	359	.0575
Alameda	6,026	525	.0870
Fresno	5,678	305	.0540

* The California Division of Real Estate.

[1] An indication of the degree of dispersal of ubdivisions:

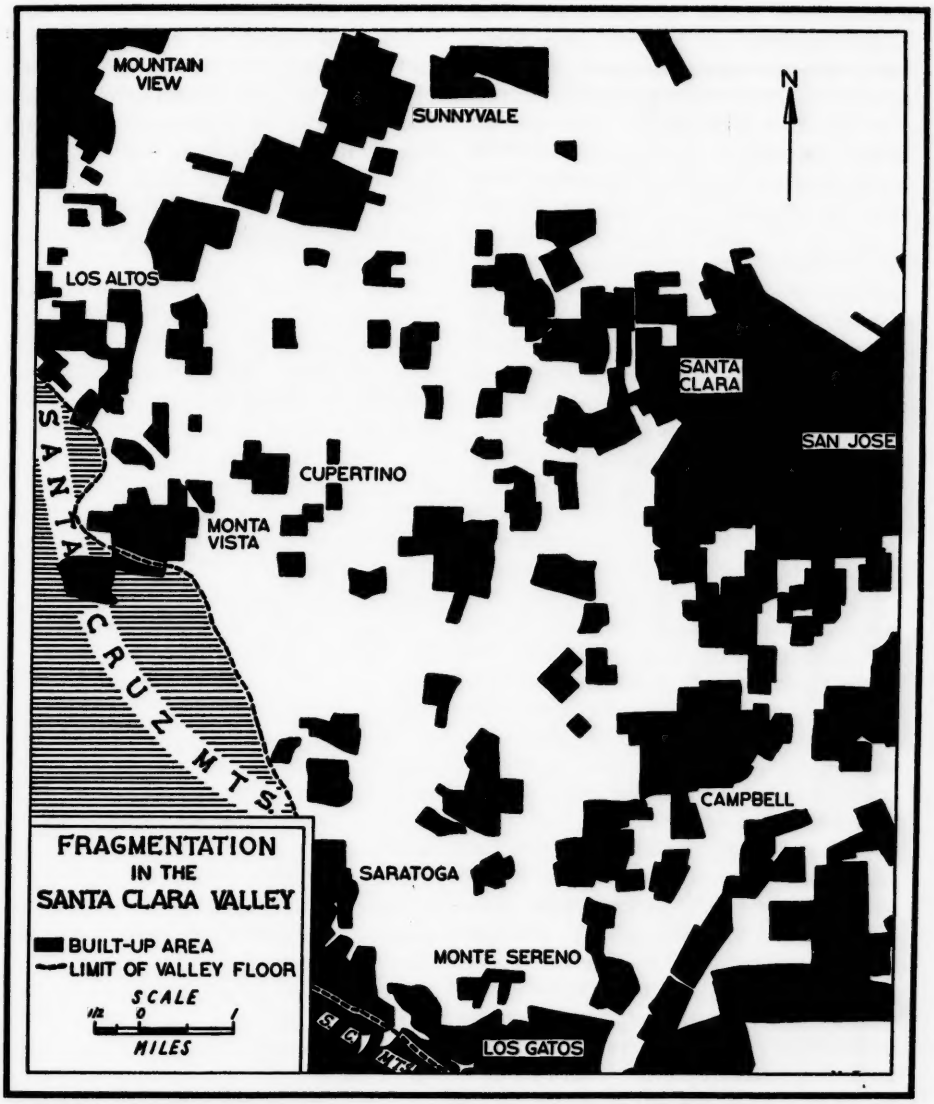
(Continued on page 319)

[32] Ernest A. Englebert, "What Research on Agricultural Zoning has Revealed to Date;" Paper read at the Statewide Conference on Agricultural Zoning, California State Chamber of Commerce, San Francisco, January 27, 1956.

[33] Probably the best specific examples are the freeways radiating from Los Angeles eastward into the San Gabriel Valley (San Bernardino Freeway) and southward onto the Santa Ana Plain (Santa Ana Freeway), and the East Shore Freeway extending south from Oakland in the East Bay area.

[34] Or "shotgun development" as less sympathetic regional planners term it.

[35] Karl Belser, "The Conservation of Agricultural Land," (mimeographed), cited in "Santa Clara County—Is Agriculture Being Threatened?" *op. cit.*, p. 20.



(Continued from page 318)

the larger the value, the more extensive the dispersal. Values were obtained by dividing the subdivided acreage into the number of subdivisions. Since almost all of the subdivisions were on arable land, the index also reveals the degree of fragmentation of agricultural areas. Note that Alameda County leads in subdivision dispersal intensity but is far behind the leading counties in actual amount of land lost to urbanization; the opposite applies to San Bernardino and San Diego counties. Los Angeles, Orange, and Santa Clara counties rank high in both dispersal intensity and agricultural land loss.

The broad pattern of urban expansion in California is thus one of rapid growth of the urban core, aided by numerous and vigorously developing extensions and outliers in the more "rural" areas. A recognizable areal and chronological sequence of agricultural land use has been the result—especially in the two largest

metropolitan areas of the state, Los Angeles and the San Francisco Bay Area. Small general vegetable farms predominate on the croplands nearest the builtup core (market gardening); followed by larger specialized vegetable and fruit farms (truck farming), interspersed with dairying operations; and eventually the bordering hill land farms engaged in the more extensive dry farming and livestock raising. Numerous physical variations in the local environment modify this pattern. District variations in crop specialities and the strong competitive position of crops with extra-state markets add further complications.[36].

As the urban core expands, each of these agricultural zones is characterized by a succession of land uses, all the stages being of increasing land use intensity except the last which occurs just prior to actual urban absorption. Thus the grain land in the hill areas gives way to dry farming of vegetables—or irrigation farming where water becomes available, tree and bush crops cede to vegetables, and the former vegetable areas are annexed by the growing city. Currently, many of those areas immediately adjoining the growing urban sections, especially around the urban outliers, display a surprisingly small amount of the "dead land" characteristics described by Aschman[37] and the *Sozialbrache* ("social-fallow") aspects noted by Hartke.[38] Such serious problems as tax delinquency, which plague "dead land," are generally lacking in the intensive agricultural areas of California. Agricultural productivity, while beginning to decline, is still often comparatively high at the time of actual urban absorption. If cropping ceases, it is usually of short duration.[39] And, as already shown, neither do these areas of agricultural-urban transition represent an additional significant change in the sociologic nature of the groups occupying the land (i.e., rural versus industrial), which Hartke lists as now being so significant in northwestern Germany.

Like the areal sequence, the chronological land use succession is considerably modified and one can give only specific crop examples. In southern California, for instance, citrus has been shifting from the Los Angeles area to nearby Ventura and Santa Barbara counties. Walnuts are migrating from southern California to the Central Valley, while vegetables are beginning to crowd out prunes and apricots in the Santa Clara Valley. The latter two crops are in turn taking up more acreage in the Central Valley and the valleys north of the Bay Area, all regions of less urban pressures. The concept of areal and chronological trends in land use intensity patterns with relation to an urban area and its environs is certainly not a new one (Thunen, 1826; Burgess, 1925). But the rapidity and extensiveness of the development and change of these intensity patterns in California is noteworthy and an integral part of the current rural-urban competition for California land.

Other than urbanization of agricultural land, resource problems resulting from this roughly concentric pattern of land use change are increased draft on underground water supplies, compaction and sinking of land surfaces, and smog damage to crops. As vegetable areas take over from tree crops and grains, irrigation demands increase. The tender and short-lived nature of truck crops, as well

[36] Such sequences are more clearly recognized in agricultural areas bordering cities in the East where differences in the physical and cultural landscapes are more subtle, e.g., Indianapolis.

[37] F. T. Aschman, "Dead Land," *Land Economics*, August 1949, 240-45.

[38] W. Hartke, "Die 'Sozialbrache' als Phanomen der Geographischen Differenzierung der Landschaft," *Erdkunde*, November 1956, 257-69.

[39] Small and dispersed inliers of land blight are not uncommon, however, in the older sections of larger California cities.

as their shallow roots, make them heavy water users. Need for moisture is also greatest in the summer when the water table is lowest.[40] And as these vegetable acreages are absorbed by the cities the need increases still further. Expansion of city area also tends to compact the former rural land, thereby lowering surfaces and increasing the danger of winter flooding by nearby rivers, reducing the capacity of the underground reservoirs, and often damaging adjacent irrigation and drainage pipelines. Smog, the scourge of the Los Angeles and Bay Area populations, has also accompanied the outward expansion in urban and industrial areas. The post-World War II spread of air pollution has actually outdistanced the main urban mass so that such distant areas as Santa Barbara, Ventura, and San Diego counties are now affected by Los Angeles pollutants. Even the Fresno area in the Central Valley is beginning to complain of smog emanating from the Bay Area, almost 150 miles distant. Damage by smog to crops, especially the leafy type (i.e., vegetables, citrus), has been great. It is estimated that, since 1953, crop losses in the Los Angeles area resulting from smog have amounted to over three million dollars annually.[41]

Land Planning

Such patterns of urban expansion focus attention more on the problem of *guiding*, rather than *limiting*, its growth in California, for, as Catherine Bauer states: "great cities are necessary and desirable, ... [and] . . . . they will undoubtedly continue to grow no matter what measures of control or diversion are undertaken."[42] It is obvious that the present population and economic status of California could not have been attained without the increase in urban areas. And high efficiency in the performance of urban functions often requires the very land that is considered the most productive for agricultural purposes.[43]

Zoning control of urban expansion patterns in the rural-urban fringe has, unfortunately, been exercised largely by urban planning agencies, where the viewpoint is city-oriented. The dearth of zoning primarily in the interest of agricultural land use is revealed by the fact, that, by 1949, only 173 counties in 23 states had adopted rural zoning ordinances. California shared the lead with Wisconsin, both states having zoning ordinances in force in about one-half of their counties.[44] Minimum-lot restrictions and exclusive agricultural zoning have been the chief zoning tools used so far in California in an attempt to divert urban movements from the better agricultural lands. Logically, both of these zoning types have received most attention in the immediate coastal areas of the state—those sections where the urban-rural land ratio is the most critical. Los Angeles County, for instance, has zoned certain areas for lots with a minimum of five acres. San Diego has considered the feasibility of a ten-acre restriction. Such limitations, however, are obviously not guarantees against subdivision or other, non-urban, uses. The most recent step has been the initiation by Santa Clara County (San Francisco Bay Area) of zoning that definitely prohibits industry, commercial development, and housing

[40] *San Jose Mercury News*, November 13, 1955, p. 18.

[41] John T. Middleton, *et. al.*, "Plant Damage by Air Pollution," *California Agriculture*, June, 1956, 10.

[42] Catherine Bauer, "The Pattern of Urban and Economic Development: Social Implications," *Annals of the American Academy of Political and Social Science*, May, 1956, 66.

[43] Harris, *op. cit.*, pp. 884-85.

[44] Erling D. Solberg, "Rural Zoning Tools and Objectives," paper read at the National Planning Conference, Detroit, October 12, 1953, p. 6. (mimeographed.) Solberg also provides a comprehensive, nation-wide survey of the status of *Rural Zoning in the United States*, Agriculture Information Bulletin Number 59, Bureau of Agricultural Economics, United States Department of Agriculture (Washington: Government Printing Office, 1952), 85 pp.

from encroaching upon *un*incorporated land which is deemed more suitable for agriculture than urban use. Santa Clara Valley land may receive this "A" classification upon request of farmers after study by the county planning commission.[45] Significantly, such zoning does not aim at permanent exclusion of urban use but rather at providing more time for consideration of the best possible future use of the areas in concern.

Planning thought on agricultural zoning now seems to favor an even more emphatic step: a state planning agency, backed by a state land use inventory, with the power to limit subdivision on the best agricultural land, create "farm-protection districts," or to exercise various combinations of these two functions.[46]

An important stimulus toward land planning on a state level in California is the unbelievably conflicting patterns of local authority. As California cities expand, their boundaries extend into every direction possible. The "political sprawl," as well as the urban sprawl, of Los Angeles is legendary. A more recent example is San Jose, where of the 222 annexations made by the city since 1911, 207 have occurred *since* World War II (Fig. 2).[47] Rapid and opportunistic annexations by the various cities within the various metropolitan areas have produced a maze of eccentrically coursing boundaries, greatly reducing the possibilities for any unified planning or development program.[48] Also, several new cities have been formed in the last decade, some of which have incorporated solely as a means of protecting valuable farm land from annexation and subsequent urbanization.[49] Compounding the problem of numerous divergent city authorities are the several counties whose limits run through contiguous rural-urban fringes. The nine counties of the San Francisco Bay Area are the most flagrant illustration. "Political fragmentation" of California land is certainly no less an obstacle to efficient agricultural land use than urban fragmentation is to the efficiency of a comprehensive rural-urban planning program.[50]

More fundamental even than planning programs are the attitudes of the people who must initiate and pass on such projects and the values which guide their decisions. The prevailing urban and "industrial" outlooks of both urban and rural groups in California have already been noted. Boards of Supervisors, as well as the planning commissions, are dominated by a majority of urban peoples. Many of the farmers themselves are hesitant about stricter planning controls. In their opinion, rural zoning should be "fluid and

[46] "Agricultural Zoning," *Journal of Agricultural and Food Chemistry*, March, 1955, 185-86.

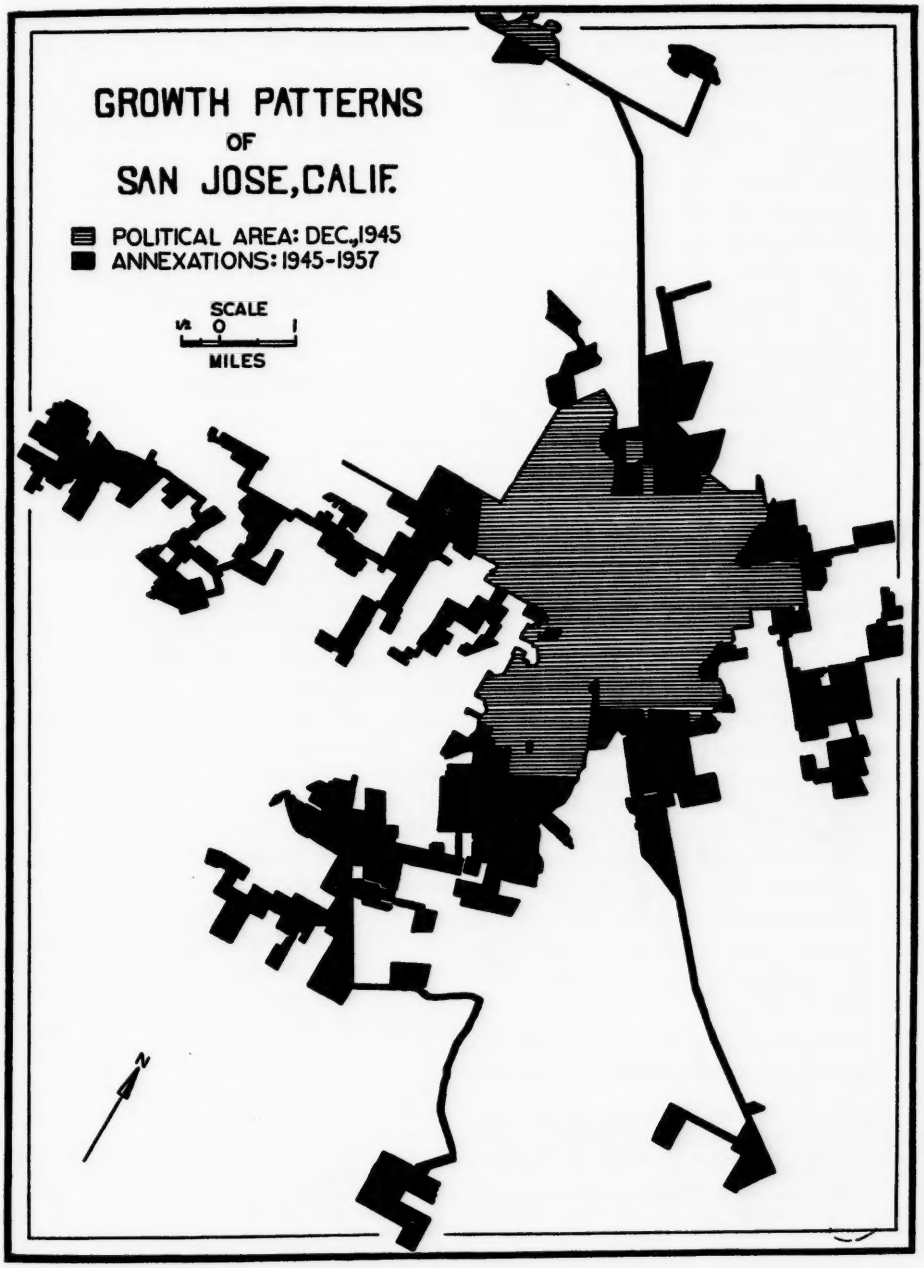
[47] Solberg, "Cities and Farms, Side by Side," paper read at the Southern California Planning Institute, Los Angeles, June 17-18, 1955, pp. 17-18. (mimeographed.) In contrast to exclusive agricultural zoning, which was started in California (Santa Clara County), experimental zoning on the *state* level has already occurred in a community near Tampa, Florida.

[48] A favorite practice of California cities desiring "shoe strings" to particularly attractive potential annexation areas is to file on sparsely inhabited districts. State law provides that where less than twelve people reside in an area, the entire parcel can be annexed if the person holding the majority of the assessed value of the area wishes it. Hence, it is possible for the majority of the eleven persons to find themselves on city land and facing city taxes, despite the fact that they might not have wanted annexation. Also, since annexation of an area with twelve people or more requires approval by a majority of the people concerned, it becomes possible for sparsely populated areas to be annexed before densely populated ones. Thus the spread of urbanization is further increased.

[49] Classic examples in the Santa Clara Valley of such boundary situations are several intersections where each corner is under a different political jurisdiction, thereby requiring four separate elections so as to provide funds for a traffic signalling system. One property is so divided that the front yard is in county territory, the house is in a city, and the backyard in still another!

[49] E.g., Cupertino in the Santa Clara Valley (largely orchard land) and "Dairyland" southeast of Los Angeles (dairy feedlot areas).

[50] North Carolina now has a regional *rural* zoning agency that includes portions of two counties and a municipality. Solberg, "Some Limitations and Possibilities of Rural Zoning," paper read at the Mid-Century Conference on Resources for the Future, Washington, D. C., December 2-4, 1953, p. 4.


GROWTH PATTERNS
OF
SAN JOSE, CALIF.
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local,"[51] rather than on a statewide and permanent basis, so that the farmer will not be prevented from selling his land if he so desires. Any proposed strong planning program must face the problem: "Can agricultural land be preserved if the owner wishes otherwise?"[52] That the owner often wishes to sell his land largely because of the great discrepancy between the agricultural value and the urban value of his land is obvious. Such a difference could be materially reduced if most of the many advantages inherent to agricultural land could be transformed into monetary values. At present, such factors as continued high *and* efficient food production, a firm resource base for important processing and allied industries, and the aesthetic values of "open areas" are ignored in the appraisal of the monetary worth of farm land. Urban values, such as highway frontage, are considered paramount in most land valuations in the California rural-urban fringes. One partial remedy suggested is that in the study of alternative areas available for urban development, preference be given that area which would be the least costly from the viewpoint of the community. Significant costs would include the net agricultural values foregone, together with the costs for essential improvement. The difference between the costs of the two areas would indicate the net community advantage of developing the least costly alternative.[53]

The application of largely urban values in assessing land and the handicap of that philosophy to conservation of agricultural land can be vividly seen in the relationship between hill land and valley-floor home site costs. Land valuations are higher and minimum-lot restrictions are greater in many of the hill and mountain districts surrounding the rural-urban lowlands of the San Francisco Bay and Los Angeles areas. Thus, the type of terrain which could afford heavy urbanization with the least amount of sacrifices of agricultural land is the very area where obstacles to home building are often the greatest. Steep slopes, while still offering construction problems, are no longer as formidable as they once were.[54]

Conclusion

Urban pressures on the land, such as population increase and the dominance of urban values, are not peculiar to California. But the intensity of many of these pressures is far greater there than in other rapidly urbanizing states. At first glance, it seems a tragic paradox that one of the most valuable, and limited, agricultural areas of the nation should be subjected to one of the most intensive urbanizings ever recorded for a state. Yet, there are mitigating factors. The present and future status of California's economy appears to rest more on industrial (i.e., urban) than on agricultural foundations. The majority of the population now depends directly on non-agricultural industries and further increase in that proportion appears inevitable. Also, rapid development in agricultural technology promises to at least retard the effects of loss of agri-

[51] Donald Stevning, "Views of a Farm Owner," Paper read at the Statewide Conference on Agricultural Zoning California State Chamber of Commerce, San Francisco, January 27, 1956.

[52] An affirmative answer in principle was provided by the United States Supreme Court in 1926 when it upheld a zoning ordinance which denied an owner permission to use his property for a purpose for which it allegedly was four times as valuable as for the use permitted by the ordinance. Solberg, "Cities and Farms, Side by Side," *op. cit.*, p. 16.

[53] *Ibid.*

[54] Slopes of 30 to 35 percent, formerly considered too difficult for home construction, are now being utilized by at least one construction company in the Bay Area. Much of the rugged terrain of the San Francisco peninsula, once assumed to be an insurmountable barrier to expansion of the built-up area of the city toward the south, is now being rapidly subdivided. Contour platting is used extensively. Hill construction is still confined largely to estate-type homes in the Los Angeles area where lowland area is less restricted.

cultural land. Perhaps, also, this increasing emphasis on industry and urban residence in California heralds a still further step in the areal economic specialization of the nation, so well characterized in earlier decades by the formation of such regions as the "manufacturing belt" and the "corn belt." Thus, in any future irrigation schemes for California and the rest of the West, for example, priority would be given to urban residential and supporting industrial uses. The East, with its surplus of water, would satisfy the future increased food demands of the West, if needed.[55] The growing water shortage and possible eventual loss of the very rich and specialized agricultural economy of the West, and especially California, are nevertheless still strong shadows on this horizon.

[55] *Stanford University Group Report on Water Resources Policy to the President's Water Resources Policy Commission* (Stanford: Stanford University Press, 1950), p. 19.

Support for Rural Institutional Changes in Underdeveloped Countries

By V. WEBSTER JOHNSON*

THE CENTRAL THESIS of this paper is that the United States Government should lend increasing support to rural institutional changes in the underdeveloped countries of the world as one phase of its mutual aid program; that doing this is a meaningful way of helping restless people develop themselves and fulfill aspirations for a more productive and a better life.

The ideas herein expressed, briefly and simply, are not new. They are more in the nature of a reminder of cherished forces present in the growth of the United States as a free nation—an experience held high in the minds of people everywhere who desire to improve their well-being and to move out of a condition of limitation of rational freedom. The people of the United States are prone to forget their experiences in the disposal, settlement, and development of the public domain which for over one hundred years was a central issue in American politics and which played such a large part in its development and growth.

The International Cooperation Administration, the universities, and the Congress of the United States, and others, are engaged more or less continuously in some type of evaluation of our foreign aid programs. There is concern for doing a better job and it is certainly worthwhile to engage in purposeful planning. One aspect of the planning process that has received relatively little attention is that which deals with rural institutions and their place in the economic development of any country.

It can be said truly that in a material sense the aid programs of the United States have been the greatest humanitarian effort in the history of mankind. The Point Four Program, on the whole, has been effective and constructive, the introduction of better tools, machines, fertilizers, improved varieties of seeds, technological changes, and training programs have meant much. During the past ten years these contributions have substantially increased agricultural production. Instead of fear of famine, some countries are now experiencing agricultural surpluses, although millions of people in the world still remain ill-fed and ill-clothed. In such cases the main problems ahead appear to lie in the distribution of returns from agriculture; in the provision of a a fairer share of the returns to the man who actually tills the land; and the making possible of a wider ownership of property in land. These are matters that center around institutional adjustments.

Within the recent past we have witnessed the revolution in Indo-China, revolts against French Colonialism in North Africa and more recently the uprising of the people of Hungary. These happenings reflect the truism that revolt and revolutions do not arise simply from grinding poverty or intolerable fear but rather from a vision of better things, a felt need for self-expression, an outlet for pent-up grievances; and a desire to express their inherent love of freedom and self-recognition.

Communists are exploiting the desire for change to their own advantage

* Teheran, Iran. This article reflects, in part, observations of the author as a result of some three years of work with the Ford Foundation and the Near East Foundation in countries of the Middle East. Responsibility for both statements of fact and opinions expressed rests solely with the author.

through intrigue, support of local issues, and the creation of false issues. The people of underdeveloped countries, seeking change but hampered by the rigidities of an established order, need support. This is not to imply that we should support all social causes arising in those countries nor, in this general area, to try to compete with the Communists. But have we done as well as conditions demanded?

In underdeveloped countries, between sixty and eighty-five percent of the people live directly or indirectly from the land. The life of the people and their cultural patterns—often with extreme poverty of the masses on the one hand and a small but powerful landlord class on the other—are closely tied to the land. Improvements in existing conditions must deal with these sources of social unrest.

With the rise of nationalism, and its emphasis on self-determination, underdeveloped countries are demanding a greater share in the advantages and incomes associated with the production and development of their resources. This is a principal economic characteristic, if not the foremost one, of the nationalist movement. Coupled with it are the aspirations of the masses for improved living.

In meeting the issues the efforts made through aid programs must be constructive. Also, the United States must not hold to the absolute righteousness of value-judgments concerning what constitutes acceptable social, economic and political order. The problem is to help the people of the underdeveloped countries to attain a better life under some type of democratic system.

If the increased incomes from land resources, mainly from agricultural products (and oil in the Middle East) flow largely to a certain ownership group or to governments, the result is a concentrated control over the larger spending power. In several of the Middle East countries governments have materially increased their incomes from oil resources and revenues, by taxes on agricultural products and other revenue sources, and by economic and military aid from the United States. As governments use their larger incomes for internal developments and for support of industrial expansion it naturally follows that controls over the economy are exercised. Some of these controls are in the form of state monopolies.

The landowning class, with some exceptions, has likewise (and concurrently) acquired greater economic power. These landowners generally reside in urban centers and their increased incomes often lead to lavish living and conspicuous consumption. Absentee landlordism usually means that the landowners are more interested in the financial returns from the land than in the welfare of the farm or village itself.

Government must, under existing conditions, be the mainspring of economic development. There is no alternative. There are obvious dangers in any concentration of power and control; yet there are also great opportunities to provide for the liberation and economic betterment of the people. An abuse of the position of government can arise if in its overall planning programs provision is not made for a wider distribution of the resources to the people, allowing them to become the owners and operators of businesses. If this is not encouraged and if instead the benefits go to a landed aristocracy, the basis may be laid for communism, fascism, entrenched government monopolies, or types of central control that make democratic institutions impossible. On the other hand, when the spending power of governments embodies also the support of land reforms, agricultural credit programs,

economic incentives for small industries, widespread ownership of property —then the total program of government will give expansion to the private sector of the economy, and this, over a period of years, will mean the growth of family-owned and -operated farms and encouragement to industrial initiative and competition.

IV.

In assisting underdeveloped countries in their economic development, the task is significantly different from that of rehabilitating war-torn countries of Western Europe following World War II. Yet we have often approached the task in very much the same manner. In both types of situations in the rural areas, a need exists for improved production practices, roads, schools, and other public facilities,—rehabilitated or new. In the underdeveloped countries much more emphasis needs to be placed on improved tenure arrangements, more adequate credit for small farmers on reasonable terms, the development and settlement of new lands, self-help village training and educational activities, and changes in the socio-cultural environment. Correct techniques of assistance are vital to a successful program.

Technical assistance, in addition to making for improved living, should also make for the growth and strengthening of democratic institutions and the benefits that flow from free nations. This involves helping people change their institutions and providing for a much improved system of government organization. The only way to overcome poverty and increase incomes is by the work and production of the people themselves; but the organizational methods used hold great promise of awakening and energizing the peasants. The services of plant and livestock specialists, soil conservationists, farm machinery experts, irrigation and drainage engineers, and other similar technicians. Institutional changes are basic to increased production and self-development, and are a function of the growth of the democratic process.

We turn now more specifically to a consideration of some of the opportunities, institutions, organizations, and motivations that condition materially the productive habits and aspirations of rural people. To give a degree of concreteness to the discussion, we shall focus attention in a general way on problem situations and needs in the countries of the Middle East, bearing in mind however, that conditions are relatively similar in all underdeveloped countries.

Government Organization for Services

It is well known that unless governments have the will and leadership to make changes in organizational operations little can be done to improve the situation. However, governments are seldom unaware of the need for progress. In most of the countries of the Middle East, the governments are taking steps to improve the position of the man on the land. For instance, marked progress has been made in the Land Reform Program in Egypt, and substantial steps have been taken by the Shah of Iran, in the distribution of Crown Land Villages, which will be considered more specifically later. At this point, we are concerned not with operating programs as such, but rather with some principles necessary to assist governments to help themselves in evolving desirable changes in their institutions.

A first requirement of technicans and operating missions is to have a sympathetic attitude toward change. Too often the United States, as a great democratic nation, born by a revolution, has shied away from social causes, very possibly on the grounds that it was the

safer course to follow, and also because of an attitude of intolerance on the part of some. In the United States where there is an abundance of resources, wide distribution of property rights, and a system of democratic organization, attitudes and reforms in other countries where conditions are much the reverse may appear, at times, radical, socialistic, or difficult to understand. And truly for some, they may be. But whatever our position may be, it should be based on tolerance, understanding, and well-founded reasoning.

Another basic principle is concerned with operation of programs in foreign countries. Of course, in some types of work, as in the case of demonstrations, a quick push can be given, particularly in the physical production field. However, even here, experience shows that demonstrational work catches on very slowly in the absence of its being a part of an operating program.

When one thinks of the instutional field, it is obvious that a technician or consultant, to be most useful, must serve within an agency of government. In this way only can he make himself of widespread influence. There is no alternative for foreign governments but to operate their own institutions and carry on the government processes. In serving government officials directly, the difficulties are recognized but the kind of confidence and trust than can and must be developed, can inspire faith and a favorable attitude towards change; and likewise give support to moral principles so essential to the growth of the democratic process.

Physical and Human Resources in Relation to Development Opportunities and Security of Tenure

Relationships between man and land are fundamental to the economic development of a country. The adequacy of productive land and water resources, the intensity of their use, and the density of population are significantly related factors. A major need in the Middle East Countries is a fuller use of the potential productivity of the better lands, the further development of land and water resources, and a wider distribution of the returns from the land. Not only are lands poorly developed generally, except in Egypt, but the people lack the technical knowledge, trained personnel, and capital resources which, if properly combined with physical resources, could set in motion a series of economic and social changes that could provide much higher real incomes and a better life. Land and water programs —multi-purpose projects that provide for land development, irrigation, flood control and power—are strategic in the economic development of the Middle East.

Except in Egypt, the pressure of population on the land is not a serious problem. There the inhabited and cultivated land area is concentrated on the banks of the Nile and its delta and this constitutes only between two and three percent of the area of the country. The proposed Greater Aswan Dam would provide water for about an additional 2,000,000 acres of farm land, or an increase of one-third over the present cultivated area. In Jordan and Lebanon the potentialities and demands on the land are less than in Egypt. The Palestinian Arab refugees in Jordan have for sometime made for an explosive situation but much could be accomplished to relieve a serious human problem by the proposed Jordan River Development Project.

In other countries of the Middle East, there are greater opportunities for land and water development. In Iran and Iraq huge amounts of potentially culti-

vable land remains uncultivated. In Iran the area can be at least doubled; in Iraq it is at least 3.5 times the present cultivated land area; and, as is well-known, large, multi-purpose development projects are underway on the Euphrates and Tigris Rivers. In Syria, the potentialities are also considerable. The amount of land that properly may be brought into a higher use depends not only on physical feasibility but on development costs in relation to anticipated increased returns. But it can be truly said, that the land and water potentialities of the Middle East afford a good base for economic development: the more effective utilization of the labor supply; an expanded market; the promotion of foreign trade; and the rise of a much improved land ownership pattern.

In the first stages, land and water development programs are largely physical: the harnessing of the available water resources; the preparation of the land; the laying out of farm units; the introduction of new technological practices. There is no question but that these jobs can be done. But, as has been pointed out, property relationships in land must be established and an opportunity to acquire such rights just be provided. These are powerful forces for creative individualism. A wide distribution of property in land is a pillar of democracy. In the distribution of our public domain Thomas Jefferson declared that "the small landholders are the most precious part of a state and that the power of government should be used to establish numerous freeholds."

In land settlement projects, in addition to laying out economic family farms, a big and continuing task is to avoid over-investment in relation to returns; provide for reasonable interest charges; work toward a non-exploitive marketing system; establish an expanded program of good land-tenure arrangements; and introduce village-level settler guidance and service activities. These are the man-made or institutional ways of doing things: human problems involving organization; training and understanding. Very difficult but at the heart of a successful land development and settlement program. Much thought should be given to problems and approaches in this field.

Fortunately, in the Middle East, under the present tenure system most of the land that remains for development, and there are millions of acres, is held under some form of public ownership. Thus, it is not always necessary to expropriate large estates or holdings in order to provide many opportunities for landless people, and to begin progress toward an improved land tenure pattern. But progress will be slow because of physical difficulties: problems of human adjustment; problems of water rights; shortage of a trained indigenous staff; and the rigidities of the existing order.

It is also encouraging that in Egypt and Iran programs are under way for the distribution of private land. In Egypt, under the Land Reform Law, agricultural landholdings in excess of 200 feddans (slightly more than 200 acres) have been expropriated and are being distributed into small holdings, varying in size from two feddans to a maximum of five, with some special provision of orchard land. The rent of all agricultural land is also fixed at seven times the land tax. And those lands expropriated are sold to peasants at 10 times the annual rent, payable in 30 years at three percent interest. The new landowning peasant must join a cooperative society. He is required to market his crop; to purchase fertilizer, seeds, farm supplies, farm machinery, and livestock through a cooperative. The

cooperatives are the administrative arm of the Land Reform Program. As such they can be a force for democratic action by entrusting rural people with increased responsibilities and providing new opportunities for physical and human advancement in the process of economic development. Cooperatives can, of course, have the adverse effect as a continuing instrument of centralized control. Happily, the Egyptian Land Reform Program calls for the gradual relaxation of the central direction of cooperatives as the peasants themselves are able to assume more and more responsibilities.

In its various aspects, and we have touched only on some of the highlights, the program appears to be operated well and is having a significant impact on the land tenure situation, agricultural credit policies, rural cooperative operations, and community center work throughout the rural areas of Egypt. Agricultural production has also increased substantially on the distributed lands.

Until the Egyptian revolution of July 1952, the social and political life of the country was dominated largely by a numerically small number of large landowners to whom the masses of the actual tillers of the land were subservient. In terms of some real accomplishments and as a moving spirit it can be said that the diffusion of land ownership among farm families, the improvement of tenancy conditions, the inducement of investments in fields other than agricultural land, and the democratization of the economic, social and political life, have become central issues in the reorganization and renaissance of Egyptian life. The new constitution is an expression of change, and makes specific mention of the Land Reform Program.

Another achievement in the distribution of private lands in the Middle East, is the Shah's land reform program. This program was begun in February 1950 and will involve the distribution of about 225,000 acres of arable land to approximately 50,000 families living in some 2,200 villages. As of the summer of 1957, 61 villages actually had been distributed and 42 were in process of distribution. Obviously, the program has been moving slowly. Lands allotted to villagers are sold at a reasonable appraised price, payable in 25 years with no interest charge.

The central aim of the Shah's program is to improve the social and economic position of the peasant through security of tenure plus technical assistance. One phase of the plan stresses the need for helping peasants organize and operate cooperatives that would extend credit to the peasants and perform production and marketing service functions. Unfortunately, the needs of the peasant, after an allotment of land has been distributed to him, have not been adequately met. Many allotments are too small, and undue laxities and management are present in the administration of the program. These are the real weaknesses and could be critical. There is too much at stake for the program to fail, but it could! The humanitarian act and social consciousness of the Shah, the wider possible impacts of the program, and our own democratic interest should quicken us to continue moral, material, financial and technical support to phases of this enlightened social program as may be determined by careful study and mutual agreement.

Where land distribution is not voluntary, as in the case of the Shah's program, inducements may be helpful in breaking up the concentration of land ownership. For example, a national government could implement a coordinated program of land distribution and industrial development by providing a means for

landlords to transfer their capital from static investment in land to the more dynamic field of industry. The relation of the large landlord to his land has made his position rather sterile in society.

Over a period of years, the government could acquire voluntarily selected, large agricultural estates for re-sale on long term mortgages to tenant or peasant farmers with payment to landlords in government bonds. The landlords could then be permitted, on application at a central bank, to pledge the bonds as security for loans to finance approved industrial investment projects, or for participation in existing enterprises considered to be of direct benefit to the economy.

While it is recognized that, initially, this financial technique may be somewhat inflationary and needs to be carefully planned, it would stimulate business and industry if judicially controlled and the eventual effect would be anti-inflationary due to the resulting expansion of productive capacity in industry and agriculture. Land re-distribution would broaden the base of property ownership, expand business and industry, create new income and employment; and the net result should be economic advancement and a strengthening of democratic institutions.

Agricultural Credit and Cooperatives

In the countries of the Middle East, the lack of an adequate supply of agricultural credit at reasonable terms is a major impediment to agricultural development. A study of institutional agricultural credit reveals that not only is the supply far short of the demand but that the lion's share of the available loan funds goes directly or indirectly to the large landowners. Any farmer without land to offer for security, even for a loan of a few months, can secure but little credit from a bank. The small group of farmers must depend upon landlords, merchants or moneylenders for their credit needs. Loans are made against the security of the crop, and tenants pay from 25% to 200% or more, for credit advances. Could American farmers stand paying 25% on loans?

In the United States, capital has had a tremendously important role in increasing agricultural production. Improved technology has been implemented by continually increasing capital investments. This important fact is accepted as commonplace; and also that favorable credit institutions were key factors in reducing farm tenancy from about 43% to 25% of all farmers during the past twenty years. Agricultural credit at reasonable terms is a must for the proper functioning of present day farming even in underdeveloped countries; for the people of these countries are moving out of a patriarchial village economy into a commercial economy. A competitive and commercial world has thrown villagers much more on their own individual resources, causing them to attempt to do new things they have never had to do before. For this reason alone governments are faced with the responsibility of formulating and carrying out new agricultural programs which center around the farmers' stake in and the returns from the land.

The importance of agricultural credit can be illustrated by reference to new landowners who have a significant place in the economy of the Middle East. It is not possible for new settlers, without capital on reasonable terms, to use fertilizer, improved seeds, more modern farm tools, or to acquire and develop ownership of land. If new landowners are required to seek their credit needs from moneylenders, the whole program is undermined. This should be obvious.

And in the development of new lands, our agricultural surpluses might be employed to good advantage. Local currency arising from the sale of agricultural surpluses could in part be used effectively as loan funds of agricultural credit institutions. In this way certain desireable controls over the use of credit may also be exercised. Furthermore, surplus agricultural products could be used directly to good advantage by new land settlers. During the early years of land development and settlement, settlers cannot and should not be expected, under a well-planned program, to supply all of their own food requirements. Food alloted judiciously could be an effective tool of a sound settlement program.

Agricultural credit is also strategic in a general village development program. Increased production and improved rural living call for changes in the way of doing things and these in turn cannot be introduced on a permanent basis without a sound credit program organized on an institutional basis. Even if some educational activities are launched their effectiveness means increased desires; and to create desires without the means of fulfillment is a source of further unrest. The economic means, and capital is foremost, are necessary to give expression to new aspirations and to facilitate organizational reforms; and a well-trained and understanding operating staff is essential to the effective and wise use of capital.

In the expanded use of agricultural credit some type of credit supervision is necessary to protect the credit agency and the borrower. Villagers need credit but, if it is to be used wisely, the farmers also need guidance in improving farm practices and in the different uses for which the credit is extended. This type of guidance is basic to increase the income of small and medium-sized cultivators and to provide for the good use of the increased income, without which the use of credit will very likely be on an unsound basis both for the lender and the borrower.

It is often advantageous to extend credit to farmers through cooperatives. Cooperatives afford a means of getting credit to the small and medium-sized farmers at reasonable costs. Farmers can do much of the work involved in making and collecting loans and a group of farmers can assume responsibility for repayment. Furthermore, cooperatives may provide purchasing and marketing services and thus avoid these often exploitable costs that may take away benefits arising from an efficient and effective credit system.

Adequate credit at reasonable terms, supervision and guidance, the organization and servicing of cooperatives, and education and training programs are all elements of a good agricultural credit system for the Middle East countries. The job ahead is tremendous in scope, planning and execution.

Extension and Community Development Services

It is recognized that, at the village level, a need exists for education and training programs. Should this work be carried on along the lines of the Extension Service in the United States or with (or in combination with) one person at the village level to represent agriculture, public health, adult education, public works and other similar activities? Much has been written on this subject and it would not be appropriate in this paper to try to explore the content of this field. Only a few observations will be made.

Within the past few years considerable progress in our foreign aid programs has been made in village community work and agricultural extension programs. India has the most active community de-

velopment program and the International Cooperation Administration is making a special effort to expand this type of work to include the countries of the Middle East. However, the general agricultural extension approach is more prevalent. The objective of these programs and, particularly the community development type, is to encourage and promote improved farming practices, better land uses; to attack problems of rural credit institutions and cooperatives in serving the interests of farmers, and to bring about local improvements of roads, schools, health, and sanitary conditions. In extension work, emphasis has been on technological improvements in agriculture while the so-called community development programs stress an integrated development program at the village level for service agencies of government.

Obviously, extension education needs to get down to the village level to be effective and needs the support of a good credit program to carry out established or new practices economically. And furthermore, an integrated program at the village level requires top level government support and an adequately trained staff, administratively supported, to do the job. If a government is not strongly committed to a community development program, the integration of functional services is most difficult or impossible. Furthermore, it is difficult to integrate between agencies of government when the functional services within agencies have not been developed or if there is little to integrate. This does not, however, preclude the organization of village societies or working groups for self-help and mutual aid activities. When work at the village level is carried on in an organized and integrated manner, by whatever means, it is conducted in an institutional sense and is capable of servicing farmers well and in materially modifying practices in the more formal institutions, such as schools, credit systems, tenure arrangements, government organization and operation.

Research and Training

Research and training is another broad field, and here we shall touch on only some of its broader aspects, and as related to the scope of our discussion. Attention is to research for a better understanding of rural problems as an aid in developing improved programs and in training as an arm thereof, and in improving technical operations.

The situation in the Middle East focuses on a need to help present and prospective leaders of agriculture and particularly the younger men who are likely to move into key positions to acquire a better understanding of agricultural problems and to do a better job in their official positions. In this connection (rather than mention specific research projects which would involve considerable detail) some of the problem areas for needed research studies are: water rights between countries; the effects of water rights on land uses and the distribution of returns between those that supply the pumps, etc., and the actual farmers; tenure patterns under different situations in relation to good land uses and the adoption of improved technological practices; the capital outlays and adjustment aspects of land settlements and development costs for farmers; the proper size of farms in new land areas and in established farming communities; the economic and social impacts of existing land reform programs; public land management problems and needs; agricultural credit practices and problems and use of credit as an effective tool; aspects of land taxation and the taxation of agricultural products; farm price support schemes.

In the initial stage, it is obvious that this type of work must begin slowly and be partly educational and training in scope. There are many difficulties and inertias to overcome but the opportunities for effective results are unquestionable. A well-planned, long-time program, properly supported by technical assistance and integrated with educational institutions and government agencies is necessary. Research work should not be confined solely to educational institutions for to do so would very likely restrict its scope and limit its usefulness.

Not only is training needed in research but special training programs are urgently needed in operations, as in the organization and management of farmers cooperatives, the training of men to carry out a program of supervised agricultural credit, land tenure programs, and those engaged in the collection of basic data. On-the-job training by means of training centers, seminars, and conferences for technicians of several countries can be very profitable if well-planned in advance. It is recognized that some progress along this line has been made in the Middle East through the work of the Food and Agriculture Organization, the International Cooperation Administration and private foundations in cooperation with countries but efforts to date have been spotty, lack carry-through value, and have not been based upon well thought-out plans.

For a successful program of technical assistance and loans or grants-in-aid, everyone will no doubt agree that a good understanding of the problems, programs, and needs of a country is necessary. Officials of underdeveloped countries are often much in the dark on economic and social problems—and foreign technicians even more so. Valuable information and relationships can be acquired as a part of operations, if studies are undertaken, and also through special research and training programs. There is no substitute for knowledge and understanding, however, it may be obtained.

And if aid programs move more in the direction of loans, as has been recommended, then it becomes more important that studies be made to appraise projects —projects with a satisfactory rating in terms of re-payment ability, and that would stimulate latent talents and interests of people. In addition to the evaluation of individual project proposals, the alternative uses of funds between projects should be appraised, and benefit and cost studies made of the impacts on different beneficiaries. In this process, comprehensive economic analysis and planning of the economy of a country is a necessary part of a good, constructive loan program; and it is a continuing task or function of government.

Fundamental changes in any country must come from the people themselves, and indigenous leaders and students are necessary to meet the challenge; and if there is a social revolution going on in the underdeveloped countries, men must be trained within the countries. Obviously, the people themselves are their own best teachers, but much experience can be gained from foreign sources in helping shape up training and research programs, and support is needed to provide part of the means to set-up the organization necessary to do the job. Well-formulated, planned and executed training and research programs within the framework of governments and educational institutions, focused on problem situations, would contribute greatly, over a period of years, to the welfare of peasant farmers.

Economic analysis must deal with great policy issues; our minds must be bold, both in analysis and final support; and we must "find ways to do in 30 years

what might be accomplished in 300 years of laissez-faire, if at all."

Summary

In summary, in the midst of a great world revolution, which has been called "the revolution of rising expectations" and, simply expressed, means to a considerable degree a desire for change in existing institutional arrangements, the masses have new aspirations for economic betterment, self-expression, and self-recognition in the development of land resources. Although the indigenous people of these countries must develop themselves—and economic advancement is a first essential for poverty stricken people—in many ways, we can help raise real incomes and bring about better relationships of people to the land In advising and consulting, sympathetically, and with understanding and modesty; in providing the incentives of loans and grant—and serving as a part of government organization or of organized groups—we have endless opportunities in the development of land and human resources; in the extension of agricultural credit; the organization and guidance of cooperatives; land reform programs; in agricultural extension and community development services; and through training and research programs within countries, to bring about economic, political and cultural improvement for rural people of the underdeveloped countries and to make for the type of security and freedom we cherish.

Social Area Analysis: A Critical Appraisal

By AMOS H. HAWLEY* and OTIS DUDLEY DUNCAN**

THE TECHNIQUE of "social area analysis" has been proposed as a basic framework for research on the urban community, and several research studies employing this framework have appeared recently. We think it desirable that this proposal be scrutinized most carefully before much more energy goes into its implementation. Aside from the incidental technical aspects of the "social areas" approach—shared by many similar techniques—there are, we believe, serious obscurities and gaps in the theoretical formulations about "social area analysis" that must be remedied before its more ambitious claims are granted.

At the risk of doing minor injustice to some of the details of the work of Shevky and associates,[1] we wish to raise in as trenchant a fashion as possible three basic questions about "social area analysis" as it has developed to date. (1) What is a "social area"? (2) What is the nature of the "social areas" that have been identified empirically in the writings under discussion? (3) What theoretical justification is there for "social area analysis" as a method of studying the differentiation of residential areas in the city?

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[1] Eshref Shevky and Marilyn Williams, *The Social Areas of Los Angeles: Analysis and Typology* (Berkeley and Los Angeles: University of California Press, 1949;) Eshref Shevky and Molly Lewin, *Your Neighborhood: A Social Profile of Los Angeles* (Los Angeles: The Haynes Foundation, Haynes Foundation, 1949); Eshref Shevky and Wendell Bell, *Social Area Analysis: Theory, Illustrative Application and Computation Procedures:* Stanford Sociological Series, Number One (Stanford University Press, 1955); see also Robert C. Tryon, *Identification of Social Areas by Cluster Analysis: A General Method with an Application to the San Francisco Bay Area,* University of California Publications in Psychology, Vol. 8, No. 1, 1955.

I.

Shevky and Bell observe: "To date all of the published work utilizing this method has dealt with the census tract as the unit of analysis . . . . There is no reason, however, why a typology based on the three social dimensions . . . . could not be utilized . . . . for the study of cities . . . . regions . . . . or even . . . . countries." But they state also that "the social area . . . . is not bounded by the geographical frame of reference," and that "certain other populations . . . . might be selected as a unit of analysis."[2] The latter statement leaves us uncertain whether "social area analysis" is meant to be a technique for classifying geographic units only, or whether population aggregates delimited otherwise than territorially are also considered suitable for the technique.

So far as the advocates of "social area analysis" propose it as a general technique for classifying population aggregates, it appears to us that they are guilty of producing confusion and espousing a prematurely closed system. (1) They have hopelessly confused their exposition by classifying geographic units ("areas," in the usual meaning of the term) and calling the categories of this classification scheme "social areas," while maintaining that these categories have no necessary geographic or areal reference. They explicitly align their work with earlier research on urban areas and adopt the term "area analysis," but disavow a concern with what most students of the urban community think of as area structure. Nor is their terminology justified by considerations about "social space." The "social area"

[2] Shevky and Bell, *op. cit.*, p. 20.

diagrams they present are actually two-dimensional projections of a three-dimensional scatter diagram. Hence the cells of the diagram stand, not for "areas," but for "volumes." (2) Social area analysis, having been developed with census tract data, has dealt only with such variables as are available in those data. To propose that three "dimensions" derived from these data provide an adequate framework for urban sociological studies is dangerous, to say the least, for it is well known that the considerations determining what information is tabulated for census tracts are only partly, if at all related to a theory of urban social structure. We do not, of course, mean to imply that census tract data should be neglected but only to suggest that they alone are insufficient to identify the "basic factors of urban differentiation and stratification."[3]

II.

Shevky and Bell make a forthright claim about the "tract populations . . . . grouped together into larger units called social areas."[4] They say: "We do claim . . . that the social area generally contains persons having the same level of living, the same way of life, and the same ethnic background."[5] If one interprets this claim literally and examines the data impartially, he can only conclude that it is patently false. The statement would seldom hold true for the population in a single census tract, let alone a grouping of tracts. For example, a tract whose population is 25 percent Negro and 75 percent white hardly contains persons of "the same ethnic background." The mere fact that such a tract would be identified by Shevky and Bell as a "segregated" one does not justify their claim for its ethnic homogeneity.

To continue with this example, tracts with populations of diverse ethnic backgrounds are not rare in a city where processes of areal succession are under way. Moreover, it can be shown that ethnic mixture has consequences for the homogeneity of tract populations with respect to other variables. The data in Table I pertain to census tracts in Chicago having both substantial numbers of nonwhites and appreciable numbers of whites in 1950. The table reveals pronounced disparities between whites and nonwhites in the average levels of several characteristics. For example, room crowding was more than twice as prevalent among nonwhite-occupied dwelling units as among white-occupied units; white-collar employment was only half as frequent for nonwhite as for white males; nearly twice as high a proportion of nonwhite as of white married couples were without their own households. Manifestly, neither the "family status" ("urbanization") nor the "economic status" ("social rank") of nonwhites in these tracts was closely similar to that of whites.

Perhaps even more serious is the finding that in certain respects the covariation of white and nonwhite characteristics was slight. For example, a tract with a relatively high proportion of white married females not living with their husbands was about as likely to have a low as a high proportion of nonwhite married women with spouse absent. In general, the correlations between white and nonwhite housing characteristics might be described as only "moderately high;" the correlations for socio-economic characteristics were at best "moderate;" and the correlations for family characteristics were "low" or negligible.

There is no need to elaborate the argument that these data are well-nigh fatal to any scheme that classifies non-

[3] *Ibid.*, p. 18.
[4] *Ibid.*, p. 3.
[5] *Ibid.*, p. 20.

TABLE I—MEANS OF CENSUS TRACT CHARACTERISTICS, BY COLOR, AND CORRELATIONS BETWEEN WHITE AND NONWHITE CHARACTERISTICS, FOR SELECTED TRACTS WITH MIXED POPULATIONS, CHICAGO: 1950

Characteristic	Nonwhite mean	White mean	White-nonwhite correlation
Percent of dwelling units with 1.51 or more persons per room (for households of 2 or more persons)	27.9	13.5	.78
Percent of dwelling units with no private bath or dilapidated	57.6	39.0	.78
Percent of occupied dwelling units owner-occupied	17.6	19.0	.73
Median contract rent, tenant-occupied dwelling units	$42.71	$35.30	$.72
Percent of persons 25 years old and over with one year or more high school education (standardized for age)	33.8	44.2	.64
Median income for 1949, for families	$2,603.00	$3,293.00	$.60
Percent of male civilian labor force unemployed	11.6	7.3	.53
Percent of employed males in white-collar occupations	14.8	29.9	.45
Percent unrelated individuals, non-institutional population 14 years old and over	15.7	21.8	.43
Percent married females not living with spouse	19.4	11.9	.10
Percent married couples without own household	21.6	12.4	.06

Note: Income data pertain to 91 tracts; data on unrelated individuals to 90 tracts; other data to 94 tracts.

whites and whites in the same "social areas" on the grounds that they live in the same census tracts. Other data could readily be adduced for the argument that "social areas," at best, comprise populations that are homogeneous only in a relative sense and to only a moderate degree, even though patterns of areal differentiation may stand out clearly.

We are uncertain from our study of the literature what the advocates of "social areas" consider to be the connection between "social" and homogeneity. The latter may be regarded as the operational content or as the cause of the former. In either case, the more homogeneous an aggregate is the more social it is. A fair appraisal of this implied hypothesis cannot be made without knowledge of the assumptions on which it rests. On the surface, however, it is suspect. The obverse proposition that sociality cannot tolerate heterogeneity is evidently fallacious. One thing is clear: the "social area" approach has provided no theory that explains why areas are or tend to be homogeneous or otherwise, or that predicts the degree of homogeneity to be observed. This gap in the theoretical background of the method is even more serious, as we indicate in the following section.

III.

However its proponents may answer the earlier question as to the ultimate scope of "social area analysis," their research thus far has dealt with the differentiation of urban residential areas. No doubt their research will be evaluated largely in terms of its contribution to scientific knowledge of this subject. We have raised the question of the theoretical justification of this approach to areal differentiation and now venture the assertion that no such justification has been provided. Shevky and Bell make much of their efforts at "construct formation" (efforts, incidentally, that look suspiciously like an *ex post facto* rationalization for their choice of indexes) and

their development of a "theoretical orientation." But one searches in vain among these materials for a statement explaining why *residential areas* should differ one from the other or be internally homogeneous. The elaborate discussion of social trends accompanying urbanization[6] is nowhere shown to be relevant to this problem.

In the absence of any published commitment on this problem we have speculated some as to what sorts of theory might provide the motivation for elaborate procedures of census tract classification. Four possible approaches to the identification of "social areas" were considered as a means of exploring the logical basis of the concept. Whether any of the approaches is associated with the names of particular authors is immaterial. For the purposes of this discussion, they may be regarded as guesses as to how one might arrive at the conclusion that "social areas" can be identified. Nor is it implied that the several approaches to be examined are either exhaustive or mutually exclusive. It is believed, however, that they provide a fair sample of the range of possibilities.

The four approaches to the pursuit of "social areas" may be described as follows: First, the concept of "social area" may emerge more or less directly from empirical observation and classification with no discernible theoretical basis. Second, the anticipation of "social areas" in the city may derive analogically from the region concept. Third, the "social area" hypothesis may be a deduction from stratification theory. And fourth, the presence of "social areas" might be inferred from a conception of urban organization as a system of functionally interdependent units. Obviously whichever position leads the researchers into an interest in "social areas" will also govern the definition of the area unit and the procedures employed in its identification.

The Simple Empirical Approach. So far as "social areas" have a more or less direct emprical origin, they may rest merely on accumulations of formal or informal observations of spatial clusterings of similar types of people. The empirical genesis of the concept may be something like this. A department store sales manager observes that charge account sales are localized in two or three sections of the city while cash sales have a different cluster pattern. Or a police chief notes that the sites at which arrests are made are clustered by type of offense. Such observations are formulated in what may be called shopper areas or crime areas. The next step from rough conclusions of this kind is the attempt to delimit the clusters more precisely and perhaps to measure the degree of internal homogeneity in respect to the identifying characteristic. A further advance occurs when it is surmised that the people who shop in certain ways or are subject to a given frequency of arrest have other characteristics in common. It is at this point that single factor clusters or areas tend to be generalized as "social areas," i.e., areas of undetermined but presumably fundamental homogeneity which wells to the surface in shopping habits or arrest frequencies.

Unburdened as it is by theoretical trappings, the simple empirical approach seems to rest on the one assumption that "social areas" are *there*, as it were. Accordingly, the task of the researcher is merely that of locating and identifying them. This may be done by trial and error through successive correlations of pairs of haphazardly chosen demographic characteristics; for, since "social areas" do in fact exist, a significant association is bound to turn up sooner or later. Or the

[6] *Ibid.*, Chapter II.

groping through successive correlation may be shortcut by gathering together every available measure of individual attributes and submitting the mass of variables to factor analysis. This procedure has the advantage of relieving the researcher of any responsibility for making choices among variables. But it has yet to be demonstrated that a convincing theory of areal differentiation can be generated by such purely empirical procedures.

In instances in which the researcher employs, instead of measured attributes of individuals, summary values of aggregates occupying pre-established sub-areas (e.g., census tracts), special problems are encountered. Are two or more tracts with the same median income, or proportion of women working, or fertility index, etc., equally or even approximately equally homogeneous? To take the affirmative is to attribute more stability to averages than experience would justify. Or is it rather that the collection of tracts is homogeneous only in respect to the average values of the member tracts, each of which may be extremely heterogeneous? In short, when the only data available are average values for aggregates of people, virtually nothing can be said about homogeneity except for those cases in which the average approximates an extreme value.

The Analogical Approach. A second, more sophisticated, approach to the concept of "social areas" involves an inference from a regional analogy. (The similarity of some procedures of regional delimitation and those of social area analysis is quite evident.)[7] In this context the city is viewed as a microcosmic replica of the total society. The analogy may take the following form: The total society is a nucleated system of interdependences some of the unit parts in which are physically homogeneous areas called regions; the city is a nucleated system of interdependences, therefore it should have some parts corresponding to regions, that is, sub-areas of physical homogeneity. Thus in the analogical approach there is a primary emphasis on area as a physical fact, while the characteristics of the occupants are treated as dependent variables. Much of the early "natural area" usage seems to have been cast in this form. How the independent variable is expected to operate to produce homogeneity is not clear. Presumably the physical features of a sub-area may either mold the human occupants to a common type or they may select occupants of a given type.

It has frequently been observed that geography is reduced to space in the city. This is to say that the determinants of location in the city are site rents and transportation costs. Every other physical feature is subordinated to these considerations; it may even be removed or in other ways neutralized if the locational values gained thereby warrant the expense. What, under these conditions, is the nature of physical areas in the city? It would seem that the only meaningful physical areas would be those created by occupants of a given type, e.g., factory districts, low income housing districts, apartment house districts, etc. But this places the regional analogy in a tautological position. If the only physical distinction a sub-area may gain is derived from the building structures erected by its occupants, area becomes a dependent rather than an independent variable. In consequence, the regional analogy, at least in its casual implications, breaks down in the urban setting.

It may be argued, however, that the sub-area as developed by one group of

[7] Compare Tryon, *op. cit.*, and Margaret Jarman Hagood, "Statistical Methods for Delineation of Regions Applied to Data on Agriculture and Population," *Social Forces*, March 1943, pp. 287-297.

occupants is a de facto physical environment for their successors. There can be no quarrel with this contention. But it must be recognized that physical sub-areas of the type described here are subject to a high degree of instability of an irreversible sort. For the same circumstances which brought them into being may continue to operate to reconstitute them in new forms. The growth of the city and the expansion of its area of influence are accompanied by a progressive redistribution of land uses within the city. Even in the absence of secular growth, the network of interdependences in which a city is enmeshed may periodically or continuously transmit disturbances to the city which result in redistributions of land uses. It may be supposed, therefore, that sub-areas are often undergoing stages of transition from one type of occupance to another. Where that is the case, heterogeneity may be more prominent than homogeneity.

The Stratification Theory Approach. In a third approach "social areas" might conceivably be derived from stratification theory. While the term 'stratification theory' is somewhat ostentatious, there are certain propositions which for want of a better label may be called collectively a theory. Converting the general stratification hypothesis to an assumption, we have: Persons of equivalent rank position on a prestige scale behave in similar ways, interpreting ways of behaving, in this case, to include the selections of places of residence. As a second assumption, it may be proposed that places of residence of a similar type are spatially clustered. It is then possible to complete the syllogism with the inference: Persons of similar rank position occupy spatially clustered places of residence. If these premises are true and the inference is valid, one should find in every city residential areas which are internally homogeneous in the rank positions of their occupants and which are bounded by other areas occupied by persons of consistently higher or consistently lower social rank positions.

Of course the assumptions may be false or at least in need of considerable qualifications. It is possible that the degree of similarity of behavior may not be uniform at all rank positions. Convergence upon a norm of behavior may be noticeable only in the middle of the social rank range, while behavior at each extreme of the range may show wide divergences. Again, it may be discovered that not all forms of behavior are equally affected by rank position. This could be true of residence selection if there is any substance to the belief in the relative impersonality of city life. On the other hand, although there may be a generalized order in the land use distribution within a city, there may be no clearly defined sub-areas, especially where rapid growth has been in progress for some time.

Data published by Duncan and Duncan[8] are relevant in this connection. Their figures show that the spatial overlap, on a census-tract basis, between the two most widely separated major occupation groups (professional and kindred workers, and laborers) amounted to 46 percent in Chicago in 1950. This finding, together with the larger percentages of overlap between other pairs of occupations, makes it evident that census tracts with a high degree of homogeneity in occupational status must be quite rare. This does not gainsay the proposition that spatial separation of status groups parallels their "social distance." But it does emphasize that characterizing individuals on the basis of their residential locations alone is subject to a large error.

[8] Otis Dudley Duncan and Beverly Duncan, "Residential Distribution and Occupational Stratification," *American Journal of Sociology*, March 1955, pp. 493-503.

The Functional System Approach. The city, however, is not just a place where bearers of rank positions congregate. It is commonly acknowledged that the city is also a social structure. The term "structure," when applied to a social phenomenon, obviously means more than an orderly arrangement of immobile parts, such as the types in a typology or the strata in a stratification. The adjective "social" imparts connotations of dynamics, of interchange, and of influence. Hence social structure would seem to denote a system of operating relationships which has been abstracted from its temporal context for purposes of analysis. The social structure of the city may be regarded as an allusion to the presence of a system of relationships among units which regularly engage in more or less specialized and therefore complementary activities. Of course the city is not a complete system; it is a nuclear part of a territorially ramified network of relationships coextensive with the total society. Nevertheless, since we are concerned here with an aspect of the spatial distribution of urban components within the city, we shall speak of the city as a system but without imputing any specific boundaries to the system.

If we work from this conception, then the analysis of spatial distributions and patterns must be in terms of structural and operating features of the system rather than characteristics of individuals or attributes of the physical landscape.[9] Types of housing, rates of vital phenomena, and most demographic characteristics have only the vaguest operational value for the properties of a system. Exceptions among demographic characteristics are occupations, labor force status, and employment status. But even these convey too general a reference to be adequately descriptive. By structural and operating features of the system, we mean units which perform certain functions relative to one another and the interrelations among such units. Whether the units are individuals or groupings of individuals need not be specified here.

In order to deal with the spatial implications of the urban system let us define one of the equilibrium conditions of the system as follows: the interrelated units are disposed about a localized area such that the accessibility of one to another bears a direct relation to the frequency of exchanges between them. An immediate inference from this proposition is that all units X which have a given frequency of exchanges with any single unit Y will have locations equidistant from Y. Thus around each Y unit would be concentric belts occupied by X units having differing frequencies of exchange with the unit Y. Each unit X, however, has relations not with one but with many different Y units. Some order is salvaged from this confusion-threatening circumstance as a result of the fact that many of the specialized units in a community are clustered at or about a more or less central location. If all such units were so concentrated, a neat zonation of units by frequency of inter-change would result. The "social areas" under these conditions would approximate symmetrical concentric zones.

All specialized units are not concentrated at a central point, however; nor is linear distance an adequate measure of accessibility. One might venture the suggestion that as distance ceases to be the sole determinant of accessibility, specialized units tend toward a wider scatter. In any case, subsidiary clusters of specialized units appear at scattered points over the urban area. Applying the principle of zonation by frequency of

[9] Rutledge Vining, "Delimitations of Economic Areas: Statistical Conceptions in the Study of the Spatial Structure of an Economic System," *Journal of the American Statistical Association*, March 1953, pp. 44-64.

inter-change, every such cluster should be ringed by a series of concentric zones with the number in each series varying with the types of functions performed by units of the cluster. Thus the zones arrayed about a principal center or cluster would be overlayed by a number of concentric series based upon subsidiary centers or clusters. If each zone tends to be occupied by functionally homogeneous units, what degree of homogeneity can be expected in the segments formed by intersecting zones? Two possibilities suggest themselves. Either the occupying units are homogeneous because their locations correctly reflect their several types of relationships with different centers or clusters or the units are heterogeneous owing to (1) a large variation in the control on location exercised by each functional relationship, or (2) the influence of certain functions is considerably stronger than that of others. A third possibility, of course, is that so long as a city is growing its social system is not in equilibrium and consequently no rational distribution of units by type of functional relationship is to be expected. Whether the segments formed by intersecting zones are homogeneous or heterogeneous in the functional relationship maintained by their occupants is an empirical problem. But if it should be discovered that such segments are heterogeneous, the next step is to determine what proportion of the total area of the city is contained in two or more concentric zones. It would not be surprising to find that virtually all of the area is so distributed.

The difficulty with the functional system hypothesis as stated is that it over-simplifies the determinants of location. The locations of units must be appropriate to the conduct of their activities as well as to the maintenance of the relationships in which those activities involve them. Every functional unit must have sufficient space in which to carry on its processes including room for storage, parking, etc. It should also be relatively free of disturbing influence, a requirement which applies particularly to the household unit engaged in raising children. The hypothesis based on frequency of inter-change is, in effect, a special case of a more general principle which may be stated as: Units of any given functional type have similar location requirements and therefore tend to cluster in space. The empirical question raised by this hypothesis concerns the relative importance of different location determinants. Unfortunately time does not permit a further development of the line of reasoning pursued here. Perhaps it has been carried far enough to indicate that the functional system approach provides a theoretical basis for the derivations of sub-areas of homogeneity. Whether such sub-areas have any significance for the functioning of the system is contingent on how the system is defined.

IV.

In sum, it seems to us evident that "social area analysis" boasts no theory that cogently relates hypotheses about areal structure to propositions about social differentiation. Until such a theory is stated and tested the research on differences among urban census tracts merely serves to signify the existence of a problem of scientific explanation rather than to point the way to its solution.

Our general negative appraisal of "social area analysis" rests not only on the arguments presented in the foregoing. For example, we believe that it could be shown, space permitting, that the alleged advantages of the Shevky tract classifications as a framework for

field studies are largely illusory.[10] And we could elaborate at some length our critical reactions to matters of conceptualization and technique. In this paper we have sought to identify the major issues facing proponents of "social area analysis" and investigators inclined to adopt its techniques.

[10] Shevky and Bell, *op. cit.*, p.22.

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Change in Tax Depreciation Policy and Public Regulation of Business

By DWIGHT S. BROTHERS*

Introduction

IN 1950 a so-called rapid amortization provision was introduced into the income tax law entitling taxpayers to deduct as amortization expense at a substantially more rapid rate than normally allowed a designated portion of the cost of facilities certified as necessary in the interest of national defense.[1] And in 1954 a so-called accelerated depreciation provision was enacted permitting taxpayers to elect depreciation methods for tax accounting purposes which result in more rapid rates of write-off than previously allowed.[2] Rapid amortization and accelerated depreciation substantially affect the taxation of business income in a number of industries but these provisions in the income tax law are especially significant for the regulated sector of the economy. This paper is concerned with the effect of rapid amortization and accelerated depreciation on companies in the regulated industries and with the problems raised by these tax provisions for the regulatory processes.

Review of the Rapid Amortization and Accelerated Depreciation Provisions

Taxpayers obtaining certificates of necessity under the rapid amortization provision are permitted to deduct as amortization expense in equal annual installments over a five-year period that portion of the cost of certified facilities which is deemed by the certifying authorities to be attributable to defense purposes. The remainder of the cost of such facilities is depreciable at normal rates. The certificate of necessity program, as it is called, is administered by the Office of Defense Mobilization. The criteria employed in determining the eligibility of facilities for certification under the program are the extent to which the facilities are related to the defense effort and the extent to which a shortage of such facilities is deemed to exist. However, consideration is also given to a number of other factors including the stimulation of new and improved technology and the location of proposed facility expansions. Determination of the portion of the cost of certified facilities which is eligible for rapid amortization is based primarily upon the estimated value of the facilities at the end of the five-year amortization period, the extent of other types of governmental financial assistance, and the extent of the tax incentive deemed necessary to induce the desired amount of defense facility expansion.[3]

The depreciation provision included in the Revenue Act of 1954 stipulates that depreciation allowances claimed for tax purposes in respect of new tangible assets constructed or acquired after 1953 having prospective useful lives of three years or more are reasonable allowances

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[1] Revenue Act of 1950, section 216. The rapid amortization provision included in the 1950 Act was continued substantially unchanged in the Revenue Act of 1954, section 168.

[2] Revenue Act of 1954, section 167.

[3] ODM Regulation 1, *Issuance of Necessity Certificates Under Section 124A of the Internal Revenue Code*, *The Federal Register*, February 9, 1954. See also, U. S. Congress, Joint Committee on Defense Production, *Review of Tax Amortization Program*, Defense Production Act Progress Rept. 25, Senate Rept. 154, 83rd Cong., 1st Sess., 1953, pp. 3-7; 15-16.

During World War II a rapid amortization provision somewhat similar to that currently in effect was enacted. However, this earlier certificate of necessity program differed significantly from the current program inasmuch as it was usual under the earlier program to permit the full cost of certified facilities to be written off for tax purposes during the period of war emergency or over a five-year period, whichever was shorter. Second Revenue Act of 1940, section 302.

if computed according to one of the following accelerated methods: (1) The declining balance method at a rate not exceeding twice the allowable straight line rate; (2) the sum of the years-digits method; or (3), any other consistent method which does not produce an accumulated allowance during the first two-thirds of the useful life of property in excess of that produced as a result of application of the declining balance method at double the straight line rate.[4] While taxpayers were not required to employ the straight line method under the earlier depreciation provision, only this method was given prior approval and the usual practice in the regulated industries was to depreciate property for tax purposes at straight line rates. Most states have followed the lead of the federal government in permitting accelerated depreciation methods to be employed in income tax accounting.

[4] Section 167 (b).

Employment of Rapid Amortization and Accelerated Depreciation by Regulated Companies

Companies in the regulated industries have sought and received certificates of necessity on a vast scale. The latest official statistics available on the participation of the regulated industries in the certificate of necessity program are summarized in Table I. These statistics show that as of December 28, 1955, companies in the regulated industries had received certificates of necessity for projects with an estimated total cost of $13.9 billion and that $7.4 billion, or 53.3 percent, of this amount was certified as eligible for rapid amortization. At that time companies in these industries had accounted for 42.1 percent of the total expenditures for facilities eligible for rapid amortiza-

TABLE I—PARTICIPATION OF THE REGULATED INDUSTRIES IN THE CERTIFICATE OF NECESSITY PROGRAM: AS OF DECEMBER 28, 1955

INDUSTRY	Number of Certificates Outstanding	Estimated Total Cost of Certified Facilities	Amount Certified for Rapid Amortization	Applications Pending	
				Number	Estimated Total Cost of Facilities
		(*millions*)	(*millions*)		(*millions*)
Utilities and Sanitary Services[1]	920	$ 6,311	$ 2,834	133	$ 1,317
Railroads	2,114	4,936	3,262	230	1,028
Pipeline transportation (petroleum)	235	1,208	329	9	122
Water transportation	745	887	533	10	214
Air transportation	43	550	443	24	908
Total	4,057	$13,892	$ 7,401	406	$ 3,589

[1] Includes "electric light and power," "natural gas transmission," and "electric light and gas utilities."
Source: Office of Defense Mobilization.

tion under the certificate of necessity program. In the first quarter of 1956 an additional $753 million in electric power facilities, $576 million in railroad facilities, and $510 million in air transportation facilities reportedly were certified, constituting 90 percent of the total cost of all facilities certified during this three-month period.[5] The certificate of necessity program has been sharply curtailed in recent months.[6]

The extent to which accelerated depreciation methods as provided for in the Revenue Act of 1954 have been elected for purposes of tax accounting by companies in the regulated industries is not definitely established.[7] It seems reasonable to believe, however, that most regulated companies either currently are employing accelerated depreciation or in the future will reopen income tax returns for 1954 and subsequent years and elect accelerated depreciation at that time. This is so since election of accelerated depreciation is of substantial financial benefit and there exists the threat that regulatory commissions in rate determinations will disallow income taxes and interest expense incurred by reason of failure to employ accelerated depreciation. Expenditures in the regulated industries on new plant and equipment in 1954, 1955, 1956, and the first quarter of 1957 are shown in Table II. It is apparent that enormous amounts of capital expenditures eligible for accelerated depreciation have been made by companies in these industries.

Financial Benefit of Rapid Amortization and Accelerated Depreciation

Rapid amortization and accelerated depreciation are financially advantageous because they result in a favorable redistribution as between fiscal periods of depreciation deductions and hence income taxes. In the short run a reduction

[5] U. S., Congress, Joint Economic Committee, *Implications of Recent Expansion of Special Amortization Program*, Staff Report, May 28, 1956, pp. 4-5, 8-10.

[6] Participation of regulated companies in the World War II rapid amortization program was substantially below what it has been in the current program. Under the earlier program companies in the regulated industries (i.e., in the railroad, electric power, and motor, water, and air transportation industries) invested $1.9 billion in certified facilities involving $25,000 or more. This constituted about 28 percent of the total expenditures for such facilities certified under the World War II program. George Terborgh, *Amortization of Defense Facilities* (Chicago: Machinery and Allied Products Institute, 1952), p. 29.

[7] The only statistics on the matter known to the author are the result of a poll of members of the American Gas Association taken in 1955. See Richard A. Rosan, "Accelerated Depreciation—Pro and Con," *American Gas Association Monthly*, November 1955, p. 27.

TABLE II—EXPENDITURES IN THE REGULATED INDUSTRIES ON NEW PLANT AND EQUIPMENT: 1954-1957
(*millions*)

INDUSTRY	1954	1955	1956[1]	1957[1] (Jan.—Mar.)
Public Utilities	$4,219	$4,309	$4,817	$1,159
Railroads	854	923	1,263	392
Transportation, other than rail	1,512	1,602	1,753	445
Communications	1,717	1,983	n.a.	n.a.
Total	$8,302	$8,817	$7,833[2]	$1,996[2]

[1] Estimates for the fourth quarter of 1956 and the first quarter of 1957 are based on anticipated capital expenditures reported in October and November 1956.

[2] Exclusive of expenditures in the communications industry.

Source: Department of Commerce.

in income taxes is certain to be realized. Whether in the long run income taxes will be affected depends in the case of rapid amortization upon the direction of any changes in the marginal rate of income taxation and in the case of accelerated depreciation upon the level or rate of investment expenditures. Whatever the long-run effect of rapid amortization and accelerated depreciation on income taxes, there results as a consequence of revision in the timing of income tax payments a saving of interest. These propositions are explained in the following paragraphs with the aid of numerical examples.

Rapid Amortization. Suppose that in 1950 a company invested $1 million in a facility 50 percent of whose cost was certified for rapid amortization. Assume that the useful life of this facility is thirty years. Differences in deductions for capital consumption resulting from rapid amortization are shown in Section I of Table III. Assuming a constant marginal tax rate of 52 percent, the total cumulative reduction in income taxes reaches a maximum of $216,667 in 1954 and is gradually offset in full by higher income taxes during the succeeding twenty-five years. However, if the rate of income taxation is changed, rapid amortization will affect the total of income taxes payable over the thirty-year period to the extent that the total tax-saving power of deductions for capital consumption is affected by revision in the timing of such deductions.[8] In the absence of tax rate changes the financial benefits of rapid amortization is limited to the interest-free use of funds which is permitted as a consequence of deferment of income tax payments. In this example, assuming a cost of capital of 4 percent and assuming that the deferred tax payments and the interest savings are accumulated by the investing company, the total interest saving over the thirty-year period amounts to $264,760.

If the company invested $1 million in a certified facility in 1954 rather than in in 1950, still assuming a useful life of thirty years and eligibility of 50 percent of the facility's cost for rapid amortization, the financial benefit of certification would be lessened. This is so since in 1954 and subsequent years the alternative to rapid amortization of the eligible portion of the facility's cost is accelerated depreciation as provided in the Revenue Act of 1954 rather than depreciation at the straight line rate. Section II of Table III shows the tax and interest benefit resulting from rapid amortization of the designated portion of the facility's cost rather than depreciation of the full amount of the cost in accordance with the sum of the years-digits method.

Accelerated Depreciation. Suppose that in 1954 a company invested $1 million in a depreciable asset having a useful life of thirty years and that the company elected to depreciate this asset for tax purposes in accordance with the sum of the years-digits method as provided in the Revenue Act of 1954.[9] The financial benefit of accelerated depreciation of this single asset is shown in Section I of Table

[8] During the period 1950-1953 so-called excess profits were taxed at the rate of 30 percent in addition to the normal 52 percent corporation income tax. Companies in the excess profits tax bracket were taxed at the marginal rate of 82 percent and therefore these companies realized a greater tax saving from deductions for capital consumption allowable during these years as a result of the certificate of necessity program than would have been realized from the same amount of deductions taken in 1954 and subsequent years following repeal of the excess profits tax. Very substantial tax savings were realized under the World War II certificate of necessity program since during the amortization period the marginal tax rate was as high as 95 percent while in the postwar period 1946-1949 corporation income was not taxed at rates higher than 38 percent.

[9] The sum of the years-digits method is selected as the basis for comparison in the numerical examples because this method is usually more favorable to taxpayers than any other permitted under the 1954 Act.

IV. The cumulative total reduction of income taxes reaches a maximum of $125,806 in 1968 and is gradually offset in full over the remainder of the thirty-year period. Thus, where a single asset is involved the effect of accelerated depreciation is similar to that of rapid amortization inasmuch as the long-run financial benefit, in the absence of change in the rate of income taxation, is a saving of interest.

However, if the company is a continuing concern, additional expenditures for depreciable assets will be made in years subsequent to 1954. Suppose that in order to maintain its present capacity it is necessary for the company to follow the 1954 expenditure with $1 million expenditures for thirty-year assets in each subsequent year. The financial benefit of sum of the years-digits depreciation in this case is shown in Section II of Table IV. By the end of 1957 income taxes are reduced by $150,968 and over the thirty-year period (1954-1983) assuming a 52 percent marginal tax rate, income taxes are reduced by $2,513, 334. In 1983 and subsequent years depreciation deductions and hence income taxes are at levels which would prevail had accelerated depreciation not been elected. Thus, as a result of accelerated depreciation, the company is enabled to deduct larger amounts for depreciation in each of thirty years and unchanged amounts thereafter. Income taxes are reduced in

TABLE III—Numerical Examples of the Financial Benefit of Rapid Amortization[1]

Year	Section I: $1 million emergency facility acquired in 1950, $500,000 of whose cost is amortized in five years.			Section II: $1 million emergency facility acquired in 1954, $500,000 of whose cost is amortized in five years.		
	Increase (decrease) in deductions for capital consumption	Decrease (increase) in income tax payments	Interest saving	Increase (decrease) in deductions for capital consumption	Decrease (increase) in income tax payments	Interest saving
1950	$ 83,333	$ 43,333	$ 0			
1951	83,333	43,333	1,733			
1952	83,333	43,333	3,536			
1953	83,333	43,333	5,411			
1954	83,333	43,333	7,361	$ 67,742	$ 35,226	$ 0
1955	(16,667)	(8,666)	9,388	68,817	35,785	1,409
1956	(16,667)	(8,666)	9,417	69,892	36,344	4,306
1957	(16,667)	(8,666)	9,447	70,968	36,903	8,772
Cumulative totals						
1957	$366,667	$190,667	$ 46,293	$277,419	$144,258	$ 14,487
1979	0	0	$264,760			
1983				0	0	$174,678

[1] This table is based on the following assumptions: that the alternative to rapid amortization in the case of the facility acquired in 1950 is depreciation at the straight line rate and in the case of the facility acquired in 1954 is depreciation in accordance with the sum of the years-digits method; that the facilities are depreciated for the full year in the year of acquisition; that the facilities have useful lives of thirty years; that income is taxed at the rate of 52 percent; and, that the investing company retains the tax and interest benefits and thereby is afforded capital otherwise costing 4 percent. The computations are based on Robert R. Herr, *Herr's Depreciation Tables* (New York: Fallon Publications, 1954). Columns may not add to totals because of rounding.

the long run regardless of what changes occur in the rate of income taxation. And to the extent that the additional funds made available as a result of accelerated depreciation are retained by the company, a sizeable interest saving is also realized.

Now, instead of assuming that the company is static in size and investing at a constant rate, assume that the company is growing, increasing its investment expenditures at the rate of 3 percent each year following the initial $1 million expenditure in 1954. The financial benefit of sum of the years-digits depreciation in this case is shown in Section III of Table IV. By the end of 1957 income taxes are reduced by $155,737 and over the thirty-year period (1954-1983), assuming a 52 percent tax rate, the total reduction in income taxes amounts to $3,992,291. In 1983 and subsequent years depreciation deductions continue to be about 14 percent higher than would be the case had accelerated depreciation not been elected, with corresponding reductions in income taxes. Thus, accelerated depreciation results in higher depreciation deductions in 1954 and every subsequent year. Income taxes are lower each year regardless of any changes in the rate of income taxation, and interest savings are realized to the extent that the company retains the additional funds made available to it.[10]

The foregoing numerical examples of the financial benefit of rapid amortization and accelerated depreciation are, of course, over-simplified.[11] However, these examples do indicate the nature and the more-important parameters of the financial benefit obtainable under these tax provisions. Considered in conjunction with data in Tables I and II concerning the participation of regulated companies in the certificate of necessity program and the volume of investment expenditures by these companies eligible for accelerated depreciation, these numerical examples indicate something of the significance of rapid amortization and accelerated depreciation for the regulated sector of the economy.

Treatment of Rapid Amortization and Accelerated Depreciation by Regulatory Commissions

Serious accounting and rate-making problems are raised in the regulated industries by the certificate of necessity program and the accelerated depreciation provision included in the 1954 Revenue Act. The accounting problem is that of deciding what constitutes proper corporate accounting procedure where rapid amortization or accelerated depreciation are employed for tax purposes. The rate problem is that of deciding how to treat the financial benefit from these tax provisions in rate determinations or, in other words, is that of deciding what should be the incidence of the benefit from these provisions as between regulated companies and their stockholders on the one hand and their customers on the other.

Accounting Treatment. Companies under the regulatory jurisdictions of the Federal

[10] For generalized mathematical formulations of the relation between rate of company growth and the financial benefit obtainable from accelerated depreciation see E. D. Domar, "The Case for Accelerated Depreciation," *Quarterly Journal of Economics*, November 1953, pp. 493-519; Robert Eisner, "Depreciation Under the New Tax Law," *Harvard Business Review*, January-February 1955, pp. 66-74 and twenty-page mathematical supplement; E. Cary Brown, "The New Depreciation Policy Under the Income Tax: An Economic Analysis," *National Tax Journal*, March 1955, pp. 81-98.

[11] There are, in addition to the assumptions stated in the footnotes to Tables III and IV, the following simplifying assumptions implicitly underlying these numerical examples: that estimates of the length of useful lives of assets are accurate; that unit rather than group accounting for depreciable assets is employed; that the certificate of necessity program is temporary so that additional facilities are not continually being certified for rapid amortization, and that the accelerated depreciation provision in the 1954 Act constitutes a permanent change in tax depreciation policy; that tax rates and the amount of investment expenditures are unaffected by the certificate of necessity program and the accelerated depreciation provision; and that the investing company has taxable income in every year.

TABLE IV—NUMERICAL EXAMPLES OF THE FINANCIAL BENEFIT OF ACCELERATED DEPRECIATION[1]

YEAR	SECTION I $1 million investment expenditure in 1954.			SECTION II $1 million investment expenditure in 1954 and each subsequent year.			SECTION III $1 million investment expenditure in 1954, and expenditures increasing at rate of 3 percent in each subsequent year.		
	Increase (decrease) in depreciation deductions	Decrease (increase) in income tax payments	Interest savings	Increase in depreciation deductions	Decrease in income tax payments	Interest savings	Increase in depreciation deductions	Decrease in income tax payments	Interest savings
1954	$ 31,183	$ 16,215	$ 0	$ 31,183	$ 16,215	$ 0	$ 31,183	$ 16,215	$ 0
1955	29,032	15,097	649	60,215	31,312	649	61,151	31,798	649
1956	26,882	13,978	1,278	87,097	45,290	1,927	89,867	46,731	1,946
1957	24,731	12,860	1,889	111,828	58,151	3,816	117,294	60,993	3,894
1983	(31,183)	(16,215)	7,553	0	0	180,164	223,648	116,297	255,454
Cumulative totals									
1957	$111,828	$ 58,151	$ 3,816	$ 290,323	$ 150,968	$ 6,391	$ 299,494	$ 155,737	$ 6,489
1983	0	0	$180,164	$4,833,334	$2,513,334	$2,170,931	$7,677,483	$3,992,291	$2,765,805

[1] This table is based on the following assumptions: that the sum of the years-digits method of depreciation is substituted for the straight line method; that assets are depreciated for the full year in the year of acquisition; that the assets have useful lives of thirty years; that income is taxed at the rate of 52 percent; and, that the investing company retains the tax and interest benefits and thereby is afforded capital otherwise costing 4 percent. Computations are based on Herr, *Herr's Depreciation Tables.* Columns may not add to totals because of rounding.

Power Commission and the Civil Aeronautics Board are required to depreciate property for corporate accounting purposes at the same rates normally allowable for tax purposes (i.e., at the same rates allowable for tax purposes in the absence of certification for rapid amortization or election of accelerated depreciation). The Federal Power Commission has ruled that, where rapid amortization or accelerated depreciation are employed in tax accounting, natural gas companies may record in their corporate accounts "normalized" income taxes (i.e., income taxes in amounts that would be incurred in the absence of rapid amortization or accelerated depreciation) instead of actual income taxes. Where income taxes are normalized, companies are required to charge a reserve for deferred income taxes account with the difference between normalized and actual income taxes.[12] Although the Federal Power Commission has not formally prescribed the corporate accounting procedure for public utilities under its jurisdiction employing rapid amortization or accelerated depreciation for tax purposes, there is reason to believe that when such action is taken provision will be made for normalization of income taxes as in the case of natural gas companies.[13] The Civil Aeronautics Board generally requires air carriers to report actual income taxes in corporate accounts but provision has been made for waiver of this requirement where a carrier employs rapid amortization or accelerated depreciation for tax purposes if adherence to it would cause "such material misstatement of the amount of income tax properly applicable to the profit taken up in the period as to undermine the integrity of the carrier's financial statements."[14] Where the requirement is waived it is provided that income taxes may be normalized in the same manner prescribed by the Federal Power Commission. Employment of the income tax normalization procedure by companies under the jurisdictions of the Federal Power Commission and the Civil Aeronautics Board prevents the effect of rapid amortization and accelerated depreciation on income taxes from being reflected in current corporate income, but does not prevent any interest savings caused by these provisions from increasing this figure.

Companies under the regulatory jurisdictions of the Interstate Commerce Commission and the Federal Communications Commission are required to depreciate property at straight line rates and to report actual income taxes in corporate accounts regardless of whether rapid amortization or accelerated depreciation are employed for purposes of tax accounting. This accounting treatment of rapid amortization and accelerated depreciation constitutes an application of the established accounting requirements of these commissions and results in the financial benefit of these tax provisions being reflected in current income.[15]

[12] The Federal Power Commission first stated the accounting treatment it contemplated for rapid amortization in Docket No. R-126, Opinion 264 (December 4, 1954) and the accounting treatment it contemplated for accelerated depreciation in Docket No. G-6358, *Order Affirming Decision of Presiding Examiner* (June 30, 1956). The original orders causing the uniform system of accounts to be amended so as to permit the income tax normalization procedure were Order No. 171 (April 21, 1954) and Order No. 171-A (May 17, 1954). In Docket R-158 currently before the Commission it is proposed to clarify the language without changing the substance of these earlier accounting orders.

[13] This is proposed in Docket No. R-159 currently before the Commission.

[14] Civil Aeronautics Board, *Uniform System of Accounts and Reports for Air Carriers*, pp. 2.5, 2.6.

[15] Both the Interstate Commerce Commission and the Federal Communications Commission have been requested to modify their accounting requirements where accelerated depreciation is elected for tax purposes, but neither commission has reported on the matter. However, on January 17, 1957, the Federal Communications Commission gave notice of a proposed rule-making in Docket No. 11913 which concerns a petition that the Commission amend its uniform

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All state regulatory commissions so far ruling on the matter have prescribed normalization of income taxes in corporate accounts where rapid amortization or accelerated depreciation are employed for tax purposes. However, the state commissions are divided on the question of what constitutes the proper accounting disposition of the difference between normalized and actual income taxes, some prescribing that a restricted or appropriated surplus account be charged, others prescribing that a reserve for deferred income taxes be charged, and one (the Public Service Commission of Wisconsin) prescribing that the difference be charged to depreciation expense and deducted from property accounts.[16] Thus, while the accounting treatment of rapid amortization and accelerated depreciation by state regulatory commissions prevents current corporate income from being affected except to the extent that interest savings are realized, the effect on the financial condition of the regulated companies as indicated by their corporate records varies with the disposition of the difference between normalized and actual income taxes.[17]

Rate-Making Treatment. Only a few rate cases involving rapid amortization or accelerated depreciation have been decided. The Federal Power Commission has ruled that where natural gas companies under its jurisdiction employ rapid amortization in their tax accounting the cost of service recognized for purposes of rate determinations should include depreciation as ordinarily computed and normalized income taxes.[18] This principle has been employed in a rate case[19] and upheld in a court test.[20] The rate-making treatment of accelerated depreciation where it is elected by natural gas companies for tax purposes is still open to speculation, although the implication has been left that it will be the same as that accorded rapid amortization.[21] The Federal Power Commission has not had occasion to rule on the rate-making treatment of rapid amortization and accelerated depreciation in cases involving public utilities but presumably public utilities will not be differentiated from natural gas companies in this matter.

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system of accounts to permit normalization of income taxes where accelerated depreciation is employed for tax purposes.

The Interstate Commerce Commission has been requested to modify its accounting requirements where rapid amortization is employed for purposes of tax accounting. The Commission, however, officially ruled in favor of the accounting treatment described in the text in Docket No. 30920 on December 21, 1951, and upon reconsideration recently affirmed this earlier decision (December 7, 1956). The Federal Communications Commission has not been asked to amend its prescribed accounting treatment of rapid amortization.

[16] C. P. Guercken, "Economic and Regulatory Aspects of Accelerated Depreciation," *Public Utilities Fortnightly*, August 2, 1956, pp. 145-67; "Summary of Accelerated Amortization Dispositions for Electric Utility Industry," *Electrical World*, June 7, 1954, p. 62.

[17] It is interesting to note in this context the pronouncements of the Committee on Accounting Procedure of the American Institute of Accountants concerning rapid amortization and accelerated depreciation. This group holds that where rapid amortization is employed for purposes of tax accounting, normalization of income taxes and recognition of tax deferment is ordinarily necessary to present a proper statement of net income. *Accounting Research Bulletin No. 43*, June 1953, pp. 78-79. Where accelerated depreciation is employed for tax purposes this group holds that "deferred income taxes need not be recognized in the accounts unless it is reasonably certain that the reduction in taxes during the early years of use . . . . is merely a deferment of income taxes until a relatively few years later, and then only if the amounts are clearly material." *Accounting Research Bulletin*, October 1954, p. 1.

A variety of procedures were employed by regulated companies in accounting for facilities amortized at rapid rates under the World War II certificate of necessity program. See National Association of Railroad and Utilities Commissioners, *1943 Report of Committee on Depreciation* (Washington: The Association, 1943) pp. 143-44. Perhaps the most common procedure was to record as operating expense actual income taxes and amortization allowances in the same amounts as permitted for tax purposes, with the amortization allowances being recorded as offsets to property accounts. This procedure was required by the Interstate Commerce Commission for carriers under its jurisdiction (284 I.C.C. 9, 10).

[18] Docket R-126, Opinion 264, December 4, 1953.

[19] In the matter of Panhandle Eastern Pipe Line Company, Docket No. G-1116 *et. al.*, Opinion No. 269, April 15, 1954.

[20] *City of Detroit* v. *Federal Power Commission* 230 F. 2d. 810 (C.A.D.C., 1955). Certiorari denied by the Supreme Court, 352 U. S. 829 (1956).

[21] In the matter of Amere Gas Utilities Company *et al.*, Docket No. G-6358, February 29, 1956.

The Civil Aeronautics Board in a mail rate case has computed cost of service on the basis of actual income taxes.[22] It is not clear whether this ruling is indicative of the rate-making treatment the Board will accord rapid amortization in subsequent rate determinations since the principal factor determining the decision was that to rule otherwise would have necessitated an increase in the government subsidy to the air carrier by the amount of the difference between normalized and actual income taxes. The Civil Aeronautics Board has not had occasion to consider the treatment of accelerated depreciation in a rate case.

Neither the Interstate Commerce Commission nor the Federal Communications Commission have officially stated the rate-making treatment to be accorded rapid amortization and accelerated depreciation. However, in the light of the accounting requirements of these commissions it seems reasonable to expect rate determinations to be based upon straight line depreciation and actual income taxes. In fact, the Interstate Commerce Commission appears to have followed this practice in recent rate cases although it is difficult to be certain because of the Commission's practice of establishing rates on a group rather than on individual company basis.[23]

Only a few state commissions have ruled on the rate-making treatment of rapid amortization and accelerated depreciation. The Oklahoma and Indiana commissions have recognized normalized income taxes in cost-of-service determinations. The Georgia Commission has indicated that it will determine cost of service on the basis of normalized income taxes but will deduct the accumulated tax deferral from the rate base. The Wisconsin Commission has indicated that it will compute cost of service on the basis of actual income taxes and normal depreciation allowances augmented by the difference between normalized and actual income taxes, and remove the full amount of depreciation determined in this manner from the rate base. The Pennsylvania and the Connecticut commissions have indicated that they will base cost of service computations on actual income taxes.[24]

Thus it appears that four different rate-making treatments are likely to be employed. If it is assumed that there are no lags in rate adjustments behind changes in rates of return and that rate adjustments are such as to maintain a constant rate of return, then the effect of these rate-making treatments can be analyzed as follows:

1. Cost of service computed on the basis of normalized income taxes: This rate-making treatment results in lower rates to the extent that regulated companies realize interest savings. Interest savings are realized to the extent that deferred taxes are substituted by the companies for funds otherwise raised externally rather than disbursed as dividends. Long-run tax savings will be reflected in the balances of liability or surplus accounts to which differences between normalized and actual income taxes are charged, but whether the eventual disposition of such balances will benefit stockholders or ratepayers is problematical.

2. Cost of service computed on the basis of normalized income taxes and the difference between normalized and actual income taxes removed from the rate base: Under this rate-making treatment rate payers benefit to the extent that interest savings are realized by the companies and to the extent that rate bases are reduced. Interest savings are realized to the extent that additional funds made available to the companies are not disbursed as dividends. Rate bases are reduced temporarily or permanently depending upon whether in-

[22] In the matter of the Reopened Trans-Atlantic Final Mail Rate Case, Docket No. 1706 *et al.*, Order No. E-9441, July 28, 1955.

[23] See Ex Parte No. 175, *Increased Freight Rates, 1951*, 284 I.C.C. 596, 597; Ex Parte No. 196, *Increased Freight Rates, 1956*, 298, I.C.C. 279.

[24] Guercken, *Public Utilities Fortnightly*, pp. 150-55; 163-67.

come taxes are merely deferred or long-run tax savings are realized.

3. Cost of service computed on the basis of actual income taxes and normal depreciation expense augmented by the difference between normalized and actual income taxes, with depreciation determined in this manner removed from the rate base: This rate-making treatment results in the same incidence of the financial benefit of rapid amortization and accelerated depreciation as number 2 above.

4. Cost of service computed on the basis of actual income taxes: Under this rate-making treatment differences in income taxes are reflected in rate levels. No interest savings are realized by the companies since additional funds made available as a result of rapid amortization and accelerated depreciation are passed directly to ratepayers in the form of lower rates. Rates will be lower temporarily or permanently depending upon whether long-run tax savings are realized.[25]

What is the Proper Rate-Making Treatment

The principal problem raised in the regulated industries by the rapid amortization and accelerated depreciation provisions is that of deciding what should be the rate-making treatment of the financial benefit. Should the incidence of this benefit be on the regulated companies and their stockholders or on the ratepayers?

It has long been the practice for regulatory commissions to include income taxes as a part of the cost of service in rate determinations.[26] And in previous instances of change in tax depreciation policy it has been the practice to reflect resulting differences in income taxes in cost of service computed for rate-setting purposes.[27] Thus, established regulatory policy would appear to dictate that the difference in income taxes resulting from the rapid amortization and accelerated depreciation provisions should be reflected in cost of service and rates.

However, two arguments are made for not doing so. First, it is argued that rapid amortization and accelerated depreciation result in tax deferment rather than in long-run tax savings and that therefore rates based on actual income taxes would merely benefit near-term ratepayers at the expense of far-term ratepayers. Second, it is argued that Congress intended the certificate of necessity program and the accelerated depreciation provision as stimuli to investment expenditures and that basing rates on actual income taxes would frustrate this intent.

As shown in Table III, rapid amortization does not affect income taxes in the long run in the absence of change in the level of income taxation. If it could be agreed that short-run reductions in income taxes do not constitute grounds for rate adjustments and that it is reasonable to assume an unchanged level of income taxation, then the first argument in favor of an exceptional rate treatment of rapid amortization would seem to be valid. In the case of accelerated de-

[25] As pointed out earlier, rapid amortization may result in long-run tax losses if tax rates are changed so as to reduce the total tax-saving power of deductions allowed in respect of the cost of certified facilities. Presumably the incidence of any such losses would be upon ratepayers. Thus, where regulated companies and their stockholders stand to share in any financial benefit from rapid amortization the certificate of necessity program becomes a "heads I win, tails you lose" affair.

[26] The legal precedent for this practice was established in *Galveston Electric Company* v. *City of Galveston*, 258 U. S. 388 (1922).

[27] In 1928 Bureau of Internal Revenue regulations were revised to permit different depreciation rates in tax and corporate accounting, and as a result many regulated companies adopted depreciation methods for tax purposes that were accelerated relative to methods employed prior to the change in regulations. See National Association of Railroad and Utilities Commissioners, *1943 Report of Committee on Depreciation*, pp. 124-25 Beginning in 1934 the Bureau of Internal Revenue initiated a policy of requiring that longer useful life estimates be employed as bases of depreciation allowances with the result that depreciation deductions were relatively decelerated in succeeding years. See Lewis H. Kimmel, *Depreciation Policy and Postwar Expansion* (Washington: The Brookings Institution, 1946) pp. 16-32. And many regulated companies depreciated facilities at extraordinary rates under the World War II certificate of necessity program. In each of these previous instances of change in tax depreciation policy it has been the usual practice for regulatory commissions to base cost of service computations on actual income taxes.

preciation, however, income taxes will be reduced in the long run where investment expenditures are made at a constant or increasing rate (see Table IV). Therefore, where it is reasonable to expect that companies employing accelerated depreciation for tax purposes will maintain or increase their rate of investment expenditures, the argument that rate determinations should not be based on actual income taxes because no long-run reduction in income taxes is involved is not legitimate.

The argument against basing rate determinations on actual income taxes which appeals to Congressional intent is more difficult to deal with. Nowhere did Congress state the rate-making treatment it intended regulatory commissions to accord the financial benefit of these tax provisions. Whether Congressional intent is implied in the legislation or in related hearings and reports is another matter. But study of this material indicates that a strong case can be made for the contention that the extent of the benefit obtainable was not fully appreciated at the time these provisions were enacted and that as a consequence their significance for the regulatory processes was not anticipated.[28] However, Congress did state quite explicitly that these provisions were intended to stimulate investment expenditures. Therefore, in searching for Congressional intent it is necessary to consider the consistency of various rate-making treatments with the stimulation of investment expenditures.

Presumably a rate-making treatment which results in the financial benefit accruing to the regulated companies and their stockholders would promote investment expenditures because of improvement in both the acceptability of investment possibilities (whether measured in terms of present values, pay-out periods, or some other index of investment worth) and the financial feasibility of additional investment expenditures.[29] But a rate-making treatment which results in passing the financial benefit to ratepayers in the form of lower rates would also tend to stimulate investment expenditures because additional facilities would be required to provide the greater volume of services demanded at the lower rates. Given the present state of knowledge concerning the determinants of investment decisions in the regulated industries it does not appear to be possible to deduce conclusively the rate-making treatment intended by Congress from the fact that the rapid amortization and accelerated depreciation provisions were intended to stimulate investment expenditures.

Thus, in attempting to answer the question of what should be the rate-making treatment of the financial benefit of rapid amortization and accelerated depreciation, one must consider regulatory and legal precedents, speculate upon future levels of income taxation and rates of company investment expenditures, and interpret Congressional intent. Because of the nature of the factors involved it appears that no unequivocal answer to the question is possible.[30]

Summary and Conclusion

The principal points made in this paper are the following: *One:* The regu-

[28] Space does not permit presentation of the case for this contention here.

[29] Some regulatory commissions take the position that it makes a great deal of difference as far as the stimulus afforded investment expenditures is concerned whether additional funds made available as a result of rapid amortization or accelerated depreciation are disbursed as dividends or retained by the companies. However, while retention of these funds by the companies would improve their ability to finance additional expenditures internally, the promise of higher dividends would induce investors to make additional funds available and thereby improve the ability of the companies to finance additional investment externally.

[30] The best evidence of this, of course, is the inconsistency in the rate-making treatment the various regulatory commissions have hit upon and the fact that in several instances the commissions themselves have split on this question.

lated industries have participated in the certificate of necessity program on an extremely large scale and election of accelerated depreciation as provided in the Revenue Act of 1954 promises to be the general practice among companies in these industries. Very substantial financial benefit has been, and will continue to be, realized in the regulated industries as a result of these recent changes in tax depreciation policy. *Two:* While the situation is still very much in a state flux, it is apparent that a variety of accounting and rate-making treatments are going to be accorded rapid amortization and accelerated depreciation. The incidence of the financial benefit of these tax provisions as between regulated companies and their stockholders on the one hand and ratepayers on the other depends upon the rate-making treatment employed. *Three:* The principal problem raised by the rapid amortization and accelerated depreciation provisions for the regulatory processes is the question of what the rate-making treatment of the financial benefit should be. However, it does not appear that an unequivocal answer to this question is possible.

The principal conclusions to which these points lead are the following: *First:* Interested parties will be well advised to maintain a close watch on developments relating to the financial benefit of rapid amortization and accelerated depreciation since very substantial sums are at stake.[31] *Second:* Change in tax depreciation policy is not a desirable means of attempting to influence investment expenditures in the regulated industries. It results in confusion in the regulatory processes. It causes distortion in accounting data. It results in arbitrary adjustments in the taxation of the income regulated companies. And its effectiveness as a means of influencing investment decisions in the regulated industries is doubtful.

[31] Stockholders of companies paying out substantially all of their corporate income as dividends will want to be certain that a part of these dividends does not constitute a non-taxable return of capital.

Reports and Comments

Feather River Water: A Rejoinder

TWO POINTS are made by Edward Neuner in his comments on our article, "Feather River Water for Southern California," which appeared in a previous issue of this journal:[1] (1) Our demonstration of enormous present-value deficits for the Feather River Project of the State of California ($100,000,000 at a 2.7 percent discount rate, $500,000,000 at 5 percent) does not conclusively show that the project is undesirable because of certain "secondary" benefits of the Project: favorable effects on employment for one thing and its contribution to development of the state for another. (2) Projects should be analyzed on the basis of financial feasibility rather than economic feasibility.

With regard to the first of these points, we mentioned the possibility of the existence of benefits over and above the anticipated revenues of the Project—the example we used was the fact that the value of the water to its consumers might exceed, to some extent, what the consumers pay in as revenues. That is, water users may derive some consumers' surplus from water sales. For a marginal increment of supply, consumers' surplus will be negligible; but for a large discontinuous increment, there may be some substantial excess of aggregate value in use over aggregate revenue.

Now, while the increments of supply associated with the Feather River Project are relatively large for some areas, it seems unlikely that any substantial consumers' surplus will exist. The reason is that the Project involves such high-cost water that we gravely doubt whether even the anticipated revenues will be forthcoming. We estimated the real costs to Southern California at $75.65 per acre-foot (5 percent discount rate). As cheaper sources than this or than the assumed $45 market value are available, we feel that we were over-optimistic in crediting even the market value, quite aside from any values over this amount. Similarly, the cost of Feather River water to Central Valley consumers, considering distribution cost, does not seem to be substantially lower than the alternatives available, though this seems rather less certain.

This consumer's surplus benefit was not among the extra-market values alluded to by Mr. Neuner, however. His reference to favorable employment (make-work) effects of the Project might be correct if the economy were faced with a condition of general unemployment during the construction phase of the Project. Conversely, however, one should cite a corresponding "secondary" cost of the Project if it were to be constructed during an inflationary period. In this event, the attempt to withdraw resources from current consumption to make such a large investment contributes to the inflationary losses imposed on the economy. On balance, we feel that analysis of a state or local project should assume that "normal" economic conditions prevail—full employment at stable prices. Where this condition fails in the one direction —unemployment—otherwise undesirable projects might become desirable. In the other (inflation), desirable projects might become undesirable. This anti-cyclical consideration should, we believe, be left to the federal government which has accepted responsibilities in this sphere. That is, in depression times the federal government *might* choose to subsidize all kinds of otherwise uneconomic projects. In time of inflation it might attempt to hold down investment even in projects which would normally be desirable. But, since control of investments is not the only counter-cyclical weapon available to the federal government, local governments should not attempt to adjust their plans for the expected cyclical effect in the absence of federal guidance. In any case, they should not assume, as Mr. Neuner does, that this cyclical "secondary" or make-work effect

[1] James C. DeHaven and Jack Hirshleifer, "Feather River Water For Southern California," *Land Economics*, August 1957, pp. 198-209. Mr. Neuner's Commentary appears on pp. 210-212.

can only be favorable—it may, perhaps equally likely, be unfavorable.

The supposed "development" benefit of water subsidies has been the subject of much flowery and grand prose, but in our opinion it is a fallacy. How is an area developed by subsidizing water rates? The real costs most certainly are incurred anyway, but their burden is shifted to taxpayers instead of water-consumers—or sometimes the burden is partially shifted to non-preferred water users who pay the costs for the preferred users. No doubt some enterprises are attracted by subsidized water rates but what types of enterprises are these? They are water-intensive enterprises, enterprises which use high-cost water wastefully because they get it at a subsidized price. In the West we have seen exactly this happen in the uneconomic over-development of subsidized irrigation agriculture; the hypertrophy of this industry (currently responsible for over 90 percent of California's water use) is the real source of the water problems of the state. The development achieved by water subsidies is one of artificial growth of industries not adapted to the natural advantages of the region. The taxes necessary to pay the subsidies *hinder* appropriate and economic development of the region's true advantages.

Financial feasibility in contrast with economic feasibility is too complex a subject to discuss here, nor is it very relevant since the Feather River Project is not financially feasible in the accepted sense of that phrase[2]—that is, the revenues do not suffice to recover the cost either at the assumed borrowing rate of 2.7 percent, or *a fortiori* at the actual current rate of about 3.5 percent. We have shown this even while accepting all official revenue and cost estimates—and some economists and engineers regard these estimates as definitely optimistic. We continue to maintain that the *correct* discount rate is the marginal opportunity cost of capital in the society (this must be at least 6 percent), rather than the borrowing rate for tax-favored government enterprises, but it is not necessary to accept this position to see that the Feather River Project is uneconomic.

A final word is perhaps called for in view of Mr. Neuner's emphasis on the limitations of economic analysis for evaluating government investment projects. A project which is uneconomic to the tune of $500,000,000 is not just a project which happens not to appeal to professional economists but one which involves a real loss of a substantial amount of our national wealth. The real problem in the world is not that excessive emphasis on project economics will prevent the realization of vast extra-market benefits which we economists somehow forget in our calculations. Rather, it is that mistaken reasoning has blown the minnow of remote and incidental extra-market effects up into a huge, vague whale of "secondary benefits," which provides an excuse to ignore economics entirely. In consequence, enterprises like the Feather River Project, the largest single water-resource project ever attempted in history, can be authorized and set under way without the slightest attempt at an economic showing of an excess of benefits over costs.

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[2] Usually financial feasibility is considered to be a stricter standard than economic feasibility—the former fails to count certain non-reimbursable benefits not reflected in project revenues. On the question of discounting, however, we argue that a project which is financially feasible only because the tax laws allow government agencies to borrow at very favorable rates should not be considered economically desirable.

Commentary: On Wendt's Theory of Land Values

IN his thoughtful article, "Theory of Urban Land Values," in the August 1957 issue of *Land Economics*,[1] Professor Wendt has bestowed upon me the welcome flattery of inclusion in a group the other members of which are such distinguished scholars as Richard T. Ely, Robert Murray Haig, Edward W. Morehouse, Herbert B. Dorau, Albert G. Hinman and George S. Wehrwein. He courteously and gently charges us, individually and collectively, with such unscholarly behavior in our explanations of land value as arriving at "highly theoretical" conclusions, oversimplification, the employment of "unrealistic and unstated assumptions," failure to consider the "dynamics of

[1] pp. 228-240

demand," and, withal, engagement in fruitless academic exercises which "have little or no applicability to present day urban land value trends."

Professor Wendt has, perhaps unwittingly, employed the straw man device so cherished among debating societies. His main attack is upon the hypothesis that a general improvement in transportation will tend to reduce aggregate land values. Ely said it first, Haig restated the concept in terms of costs of friction, and some of the rest of us have found it consistent with gradually evolving theories of city growth and structure. The rationale of this hypothesis is fairly simple: An important basis of land value is convenience or accessibility. Differentials in accessibility are reflected in differentials in the utility and thus in the value of the site. If there were no such differences, all land would have the same locational value, though differences in aesthetic advantage and geological characteristics would account for some value differences. If all sites were equally accessible, the supply of useful sites would be effectively unlimited and each site would be in competition with all other sites. Land values would be low in face of unlimited site competition and an unlimited effective supply of land. Thus any change in the direction of increased mobility of people and things through improved transportation facilities will tend toward lower land values.

Now this deductively contrived hypothesis has intrigued three generations of land economists; at first blush it stands in direct conflict with the common observation that improved transportation, such as a new bus line or faster service, results in higher land values. But of course there is no conflict. The new bus line will raise land values primarily in the area served. But a general rise in mobility affecting the entire urban population will increase competition among sites and tend to reduce land values in general.

Professor Wendt's straw man is fabricated of selected reportings of Ely and Haig with the repeated implication that Ely and Haig intended to set forth a comprehensive theory of urban land values. For example, he refers to "Haig's broad generalizations concerning the adverse influence of general transportation improvements upon site rents and values." The fact is that Haig carefully delimits and qualifies his hypothesis with such terms as "other things remaining the same" and "ceteris paribus." It is difficult to see how any reader could miss the obvious intent of both Ely and Haig to state in hypothesis form a simple cause and effect relationship clearly restricted to a general tendency under limited conditions. Apparently in Professor Wendt's opinion, Haig's failure to explicity state all of the value-generating influences and impacts of improved transportation in whatever limited form it may take discredits his entire effort to express a simple but basic relationship. I shall have to persist in my original error, if it be such, of viewing Haig's analysis as a brilliant and compact statement which advances our understanding of a complex phenomenon. Professor Wendt insists that the "Haig-Ely-Dorau-Ratcliff theory of urban land values assumes that accessibility to the urban core is the prime factor influencing locational decisions in urban areas." This assertion is a strange perversion which possibly stems from a misinterpretation of Haig's analysis which he illustrates with reference to the urban core at the same time carefully pointing out that his illustration concerns only "activities with concentric circles of influence coinciding with the center."

There are other examples of a misreading or incomplete reading of Ely, Haig, et al but let us now turn to the attempt to discredit Richard T. Ely's argument that increased efficiency in land use will tend to reduce land values. Professor Wendt makes what is to my mind a basic error in his view that "principles of monopolistic rather than competitive pricing operate in the urban land market." I believe that property owners in general would be quite surprised to learn from Professor Wendt that they occupy a monopolistic position in the real estate market. In *Urban Land Economics*,[2] I have dealt with this matter on page 366 in the discussion of rent as a monopoly return:

"Certainly the fact that some combinations of site and use are more productive than other combinations cannot be said to be monopolistic. Landlords, holding sites of various locational qualities, simply sell to the highest bidder. And for any one site there are many bidders, for each user has a wide choice of location; for most uses there are many sites of substantially the same quality, and profitable operation is possible over a considerable range of qualities. The central retail area is often used as an example of a unique and hence a monopolistic location, and the "hot

spot" or "100-percent" block or corner at the main intersection, where peak land values are found, is cited as the ultimate in locational monopoly. The owner of the best corner, however, cannot set his own price, for the bidders for his land have other choices—other locations not quite so favorable for their purposes but still favorable enough so that an attractive return can be produced. The upper limit for the rent of the best corner is set by the productivity of that use which can best exploit it. If the landlord demands a higher rent, the prospective user will prefer another location of slightly less quality from his standpoint but where his return after paying rent will be higher than if he had rented the best location at a rent in excess of its productivity.

"The central business districts in many cities testify to the lack of monopolistic control exercised by land owners. The competition of outlying retail centers is well known and many associations of central area owners have been formed to fight off this threat. In some cities, the size of the central area has actually decreased at the same time that the population of the community was increasing. The widespread phenomenon of the decentralization of retail services demonstrates that there is no effective monopolistic limitation, either natural or artificial, on the number of sites where various retail services can be performed at a profit. The same observation applies to all classes of urban land use."

Professor Wendt's notion that the urban land market is divided into many virtually non-competing submarkets is hardly defensible. We are all familiar with areas of mixed use. Detroit, which grew into a metropolis without benefit of a zoning ordinance, is a classic example of commercial, industrial and residential activities competing for the same locations and creating a melange of land uses. The very excuse for zoning is to prevent this type of competition and even zoning fails to prevent the invasion of industrial zones by residences unless specifically excluded. Professor Wendt travels in other academic company in his misinterpretation of a high degree of locational accessibility as a monopoly situation. We are dealing with a continuum of locational quality in which the value of even the best site cannot exceed the measure of its productivity to its user.

My conclusions "as to the effect of the use of the auto on land values in central areas" get short shrift from Professor Wendt; he does not concur that the growing use of the private automobile has "tended to reduce site rents in central business locations by making outlying retail centers more generally accessible." Professor Wendt is sure that I have "neglected to consider that the use of the automobile has greatly expanded the total areas served by urban centers." Here again is a scholarly myopia which makes debate difficult. The expansion of the trade area has no bearing on the tendency to reduce central site rents because of competition from outlying shopping centers. Professor Wendt is, of course, thinking in terms of the net effect which is quite another concept. There can be of no real question that shopping center competition is affecting central area values. Whether the total effect of all factors is a decline can be determined only by empirical methods. My own studies of the Madison central business district show no expansion in area in thirty years and no increase in the dollar value of land above the peak in the Twenties. This period has been one of substantial growth in population and considerable rise in the general price level. Thus the real value of central area sites has declined. I believe the competition of outlying retail and office building facilities to be largely responsible for such decline.

Early in his article, Professor Wendt promises to employ his "theoretical model of urban land value theory" as a "basis for a critical analysis of the Haig-Ely-Dorau-Ratcliff hypothesis." Since he misread the hypothesis, the promise proves difficult of accomplishment. In fact, the model quite supports the hypothesis, properly interpreted. It shows the symbol (S) representing the "supply of competitive urban land" as a factor affecting the aggregate of land values. This is what Haig-Ely-Dorau-Ratcliff had in mind with the added notion that a general improvement in transportation would step up the competition.

In sum, my evaluation of Professor Wendt's article is that it adds little to our understanding of urban land values and that it subtracts nothing at all from Ely-Haig-Wehrwein-Dorau-Hinman-Morehouse and, if you please, Ratcliff.

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The Railroad Passenger Deficit: A Comment

PROFESSOR BERGE has made a valuable study of the passenger deficit.[1] He has given a clear explanation why the only reasonable way to measure it is by subtracting from the revenue of passenger and allied services the escapable costs of this service.[2] Unfortunately, the present cost accounting systems of railroads do not enable exact measurement of the costs that would be saved by eliminating passenger services on a road or segment of road.[3] Using the best available accounts to approximate escapable passenger costs, the passenger deficit in 1954 for all Class I railroads was shown to be about $38 million. This is in contrast to the $670 million which government and railroad officials calculate by using the Interstate Commerce Commission's arbitrary cost-separation formula for joint costs of freight and passenger services. The results of this research, though they cut the passenger deficit to its approximate true size, are not optimistic. In 1955 only 8 of the 37 Class I railroads studied had passenger and allied services revenues sufficient to cover their escapable costs; i.e., all direct operating expenses of passenger and allied services.[4] Two of them, the Southern Pacific and the Baltimore and Ohio, each had direct operating loss from passenger and allied services of over $13 million. In all of them the net passenger income trend is downward.[5]

Professor Berge suggests a number of remedial changes in policy to be adopted by individual railroads. Among them are shorter, faster trains, more trains on lines with elastic demand for service, new and more efficient equipment, adjusted schedules, revised labor policies, and better merchandising and sales promotion in passenger and allied services. However, these proposals for unilateral action fail to meet the real issue.[6]

The technological shift in demand to automobiles for short trips and airplanes for long trips has resulted in a long-run decline in demand for passenger train service. Short-run policies of lowering fares and modifying service to stimulate demand are partial solutions at most. The convenience of the automobile and the speed of air travel in an economy of ever rising average annual income make rail travel a poor substitute for a large proportion of the public, even where railroad is the lowest cost transportation.

The long-run shift away from rail travel makes for underutilization of equipment and terminals. Although it may not have been true in the past, there surely is now a long-run overinvestment in the passenger service field. Class I passenger revenues declined from $961 million in 1947 to $767 million in 1954. This reflected a decline in Class I passenger-miles of 36 percent, as traffic shifted to rival forms of transport. The effect was to accentuate the acute problem of surplus excess capacity in passenger services. It is this problem of surplus excess capacity in the short and long runs that plagues much of our railroad system.[7] A final solution to the problem lies only in consolidated railroad systems and scheduled abandonment of many main lines.[8] However, there appears to be no large-scale consolidation movement in the offing though a few key roads have been having merger discussions.[9] For this reason the partial

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[1] Stanley Berge, *Railroad Passenger Service Costs and Financial Results* (Evanston: Northwestern University School of Commerce, 1956).

[2] W. Arthur Lewis, *Overhead Costs* (London: George Allen & Unwin, 1949), pages 9-15 explains the relation of escapable to fixed costs.

[3] Dwight R. Ladd, *Cost Data for the Management of Railroad Passenger Service* (Boston: Harvard University Graduate School of Business Administration, 1957). Estimates vary greatly as to how much each o the many joint costs would be reduced by eliminating passenger services. For example, one company estimated that maintenance cost per mile of track on freight only lines was about one-half the cost per mile of track on its principal lines carrying freight and passengers. *Ibid.*, 95.

[4] Berge, *op. cit.*, p. 39.

[5] See the pessimistic comments of C. E. Peterson, vice-president of the Southern Pacific Railroad in *Railway Age*, October 8, 1956, p. 10.

[6] See comments of Ernest C. Nickerson, vice-president of the New York Central, on the failure of service changes and advertising to stimulate passenger business, in *Railway Age*, September 16, 1957, p. 9. On the failure of faster, lightweight passenger trains to increase business, see *The New York Times*, September 15, 1957, pp. F1, F10.

[7] For a theoretical analysis of excess capacity, see J. M. Cassels, "Excess Capacity and Monopolistic Competition," *Quarterly Journal of Economics*, May 1937, p. 426. See also, Harold Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," *Econometrica*, June 1938, p. 242 at 264-5.

[8] See Burton N. Behling, *Railroad Coordination and Consolidation: A Review of Estimated Economies* (Washington, D C.: Interstate Commerce Commission, Bureau of Statistics, 1940); Michael Conant, "Railroad Consolidations and the Regulation of Abandonments," *Land Economics*, November 1956, pp. 318-325.

[9] *Railway Age*, November 21, 1955, p. 13; January 30, 1956, p. 13; and March 4, 1957, p. 7. See A. Jansen, "Railroad Mergers Promise New Economies for the Carriers," *Barrons*, December 17, 1956, p. 11.

remedy of coordinated, joint passenger service is proposed here.

Coordinated and jointly operated passenger service need not await total railroad consolidations. It can be a first step toward a more efficient railroad system by allowing discontinuance of passenger service on many lines showing direct operating losses from such service. By agreement of carriers to coordinate and jointly operate passenger services, the quantity of investment and of operating costs attributed to it can be reduced. This would take the form of jointly operating trains over the most efficient portions of two or more parallel or connecting passenger lines and discontinuing passenger service on the less efficient portions of the lines.[10] In most cases this would improve passenger service between major cities by permitting faster and more frequent service on trains using the shortest combined route.

Under such joint service, many small towns on the discontinued lines would lose their sole passenger train service. However, the large majority of fast, intercity trains do not stop at these towns anyway. For short trips and local service the few passengers from these towns have had to use highway transport in the past and will continue to do so. For longer trips they will have to use highway transportation over to the parallel passenger line which is kept in service. In few cases where joint operation is feasible would this be more than 50 miles.

Many instances can be cited where combined, coordinated passenger service would probably result in large savings. Some examples are: (1) The Burlington and Rock Island between Chicago and Denver, (2) The Milwaukee Road and the Northwestern between Chicago and Omaha and in many areas of Wisconsin, and (3) The Southern Pacific and the Santa Fe in central California. From Dr. Behling's study one can infer that there are a large number of such passenger consolidations that would increase overall efficiency.

For railroads with large direct operating losses from passenger and allied services, this remedy is urgent. Large losses on this minor part of total operations can endanger the profit position of the entire firm. The Baltimore and Ohio (B & O) is a prime example of this and will be analyzed in detail here. Its direct operating loss from passenger and allied services from 1947 to 1954 inclusive was $89 million. Its overall net income for the period was only $88 million. Hence, it could have doubled its net income had it not been in the passenger business. Some of the postwar freight rate increases granted to it might have been denied by the Interstate Commerce Commission, since total profit is a key factor in rate cases. Thus it can be argued that freight shippers pay for the passenger deficit although, as it is a cost of production, they may not bear the final burden.

The B & O had revenues from passenger and allied services in 1955 of $33.3 million. These revenues earned it a direct operating loss from such services of $13.7 million. Income statistics are not available as to the portion of direct operating loss incurred on different geographical divisions of the road. However, it probably had losses on most divisions. Since about half the B & O passenger routes parallel the Pennsylvania Railroad (Penn), a coordinated joint operation of sectors of these two lines will be examined here. The B & O and the Penn both offer passenger service between Chicago and New York via Pittsburgh. This entire service could be operated more efficiently if it were coordinated and operated jointly. The detailed discussion here will center on the portion between Chicago and Washington, D. C. On the first sector of this run, from Chicago to Pittsburgh, the two lines are parallel. The greatest distance between them in this area is about 35 miles. Their track distances between Chicago and Pittsburgh are almost the same. The B & O is 471.4 miles and the Penn is 468.4 miles. However, the Penn does have some advantages in this Western sector. Its Chicago to Pittsburgh run is part of its heavily traveled direct route to New York, giving it much greater business than the B & O on the same sector. Hence, its stations and other facilities are larger and probably more able to handle combined services. Its right-of-way and station facilities in Chicago are much superior to the B & O's. On the Eastern sector, between Pittsburgh and Washington, the B & O is much more direct. The B & O track

[10] In a number of instances where two or more railroads have operated parallel service and one of the lines has had the shortest, most efficient route throughout, dropping revenues have caused the other to discontinue service. Examples are the Pennsylvania-Wabash route between Chicago and Detroit and the Burlington-G.M. & O. route between St. Louis and Kansas City.

distance between these two points is 296.0 miles, while the Penn is 368.1 miles.

Substantial cost savings would arise if these two lines adopted joint service between Chicago and Washington, D. C. The presently available facts point to more efficient operation by the Penn between Chicago and Pittsburgh and by the B & O between Pittsburgh and Washington. Hence, joint and consolidated passenger service should operate over the Penn from Chicago to Pittsburgh and over the B & O from Pittsburgh to Washington. The B & O could then discontinue all passenger service between Chicago and Pittsburgh. The Penn would probably be able to discontinue service on its Harrisburg to Washington branch. On the discontinued sectors all costs of maintenance of way and of rail line which are solely for passenger use could be eliminated. Operating cost savings by joint operation of consolidated schedules should also be effected. The total cost saving should be large enough to reduce markedly any B & O deficit on its Chicago to Washington run, since it would be abandoning passenger service on 61 percent of the total mileage while joint operation should actually increase patronage of the remaining sector. Similar though smaller total savings should accrue to the Penn.

Rather than reduce total passenger service provided between Chicago and Washington, joint operation could actually increase it. The two or three fast through trains of the B & O could be continued by that line, which would turn the trains over to the Penn at Pittsburgh for the run to Chicago and back. Slower B & O runs to Chicago might be dropped in favor of new trains running between Washington and Pittsburgh and meeting some or all of the many through trains of the Penn runs between New York and Chicago. Through B & O coaches could be run between Washington and Chicago by switching and connecting coaches on to the westbound Penn trains at Pittsburgh and disnecting coaches there from the eastbound Penn trains for the trip to Washington. These suggestions are only tentative. Whatever the rearrangement of schedules, the combining of passenger service of a line with smaller traffic and high direct losses with a line with heavy traffic and none or very low direct losses will allow faster schedules at lower total costs. This will facilitate the adoption, as Professor Berge suggests, of shorter trains and more frequent service where market surveys indicate that demand will increase in response thereto.

As to the towns that would lose B & O service between Chicago and Pittsburgh, only two are major cities. These are Akron and Youngstown. However, the Penn route from Cleveland to Pittsburgh is through Youngstown, and connecting service is offered to Akron. In addition, the Erie Railroad main line connects both cities with Chicago and New York. Both of these cities and all smaller towns on the B & O between Chicago and Pittsburgh are no more than 35 miles away from the Penn main line. In most cases, bus connections with the Penn are available. It must be recalled that most small towns in Indiana and Ohio do not have direct passenger train service to Chicago and Pittsburgh. There is no reason that Auburn, Defiance and Fostoria should be guaranteed the continuance of such service when the cost to the carrier is many times the passenger fares collected from all these intermediate towns. The problem, of course, is to convince the Interstate Commerce Commission and the state regulatory commissions of this logic.

Conclusions

A long-run decline in passenger train demand is in progress. The resulting passenger deficit, direct operating losses, can be remedied only by long run plans to disinvest resources attributed to passenger service. The numerous parallel and connecting passenger lines in the country offer many opportunities to discontinue lines but still keep almost as good, and in some cases even better service through joint operation. The sooner the carriers institute such remedies to reduce the passenger deficit, the sooner all users of rail transport can benefit by lower rates.

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Book Reviews

Location and Space-Economy. By Walter Isard. New York: John Wiley & Sons, Inc., 1956, pp. 350. $8.75.

The publication of this long awaited study by Professor Walter Isard, following the recent English translation of Losch, will do much to bring the significance of spatial factors to the attention of economists. Although a large number of applied studies in location and regional economics have been published in recent years, the theoretical foundations for such work have not been carefully examined. Isard says that "the basic objective of this volume [is] to improve the spatial and regional frameworks of the social science disciplines, particularly of economics, through the development of a more adequate general theory of location and space-economy." The volume is not primarily concerned with "handling specific problems of reality" and we are promised a second volume which will apply the general theory.

Isard considers the general theory as including the total spatial array of economic activities having regard to the geographic distribution of inputs and outputs as well as the geographic variations in prices and distributions of inputs and outputs as well as the geographic variations in prices and costs. In this sense trade theory (including international trade) is really the same as the general theory considered in this book. In developing the general theory, emphasis is placed upon the substitution principle and the concept of "transport inputs." This later concept is defined as the exertions of effort and other factor services required to overcome resistance encountered in movement through space where friction is present." Isard does not think of the transport function as another factor of production but rather wishes to have economists recognize the role in the production and consumption processes played by transport inputs.

One chapter is devoted to an interesting review of statistical findings on spatial relations which indicates that there are "significant regularities associated with variation in the distance factor." The locational equilibrium of the firm is analyzed in terms of transport orientation and labor orientation. This is followed by an analysis of market and supply areas. The discussion of agglomeration along the lines of Weber includes interesting new material, particularly a consideration of urban land-use theory as an extension of agricultural location theory. Although the mathematical formulation of the general theory will discourage "literary economists," Isard's final chapter utilizing a series of graphic illustrations can and should be read by all students of locational problems. It is the best summary statement of the present status of location theory that this reviewer has seen. A notable feature of this book is the 57-page subject index.

JOHN I. GRIFFIN

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Water. The Yearbook of Agriculture, 1955. Washington, D. C.: United States Printing Office, 1955. pp. 751. $2.00.

Water, the title of the 1955 Yearbook of Agriculture, is a timely and resourceful volume on a currently important subject. This book merits an outstanding position in the long series of distinguished yearbooks.

The yearbook contains 13 sections, made up of 96 articles contributed by 149 authors. A Foreword by the Secretary of Agriculture and a Preface by the competent Editor of Yearbooks, Alfred Stefferend, introduces the volume.

Six chapters are devoted to our need for water, ten to where we get our water, five to soils, ten to watersheds, four to forests, thirteen to irrigation, ten to crops, six to ranges and pastures, ten to drainage, seven to wildlife, seven to pure water, three to horticultural crops and a final five chapters look to the future of water. These ninety-six chapters cover a wide range of topics in which many people are interested and seek

information. These chapters summarize the most recent findings and facts made available by an outstanding group of scholars from many disciplines; economists, agronomists, engineers, chemists, geologists, foresters and others.

The language of the yearbook is nontechnical and readily undertook by the lay person. Thus, the major purpose of the yearbook as stated by the Editor, "to present what is known about water in a practical and useful manner for farmers and other users of water," is fully achieved.

Technical workers in the fields covered by the yearbook will also find stimulation in the sections "emphasizing the needs for more and better information to fill the gaps in existing knowledge," which is the second purpose of the yearbook, as stated by the Editor.

In studying *Water*, one cannot help being impressed with the many facets of water problems and possible remedies. In bringing together these many facets in one volume, the yearbook contributes materially to the need for interdisciplinary studies of water and points the way for such studies.

Despite the apparent comprehensive coverage of various phases of water, several important aspects have been omitted. The volume does not include presentations on our experiences with such major water developments as Tennessee Valley Authority, Columbia Basin, Missouri Basin and other regional water developments. Also missing are discussions of the current and prospective conflicts between competing uses and users of water.

Uses of water are increasing around five percent each year. Such continued increases in demand for water will eventually bring water scarcities to all sections of the nation. With scarcities will come comflicts between uses as well as between users within and between particular uses. The resolution of these conflicts appears to constitute one of the most important as well as one of the most difficult areas of research inviting the attention of the economist and his colleagues in other disciplines.

Despite these shortcomings, which are few, the Yearbook on *Water* remains unique and useful in providing answers and understanding of water, its use and control. The Congress, the United States Department of Agriculture, the authors and particularly the Editor, Mr. Stefferend, are to be congratulated in bringing this volume to fruition for the benefit of the entire nation.

JOHN F. TIMMONS

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Industrial Location In The New York Area. By John I. Griffin. New York: The City College Press, 1956, pp. 212.

Professor Griffin's interest lies with empirical data. He uses statistical and questionnaire-interviewing sources and restricts his study to the location of manufacturing industries. His work is largely devoid of theoretical materials, notwithstanding a compentent Appendix IV on such matters.

Through questionnaires sent to firms employing more than 100 workers, a ranking was obtained of favorable and unfavorable location forces in a designated New York area. It was found that the most important favorable factors in some counties were access to markets, factory buildings, room for expansion, and rent; the most important unfavorable ones were taxes, wages, waste disposal, parking conditions and attitudes of local government officials, among others. Unfortunately, just what is meant by the term access to markets or even other terms was not defined. To a given respondent, an expression may mean one thing, to another, a quite different thought may be conveyed. In the study in question, the questionnaire was supplemented by personal interviews with manufacturers, government officials on state and local levels, and labor leaders. Terminological misunderstanding can be more readily dispelled through interviews than questionnaires, though in any case the reader was not advised of exact meanings.

Statistics are presented in the book which describe New York's manufacturing structure. The importance of clothing manufacture, printing and publishing, and the electrical machinery group is revealed. The growth patterns of suburban counties is uncovered and is compared with the decline in manufacturing employment in other parts of the area. Special investigations are included of the location problems of Passaic County and the American Safety Razor Company. These investigations highlight the outmigration trend from densely populated areas. The high taxes, high rents, unfavorable political

atmosphere, lack of room for expansion, outdated buildings, greedy unions, traffic congestion stand prominent among the forces causing this movement. The author seems to feel that local officials should offer plans to redevelop industrial facilities along with their residential improvement programs.

The failure to number charts, to define terms more clearly, and to apply in detail some theoretical system (such as Hoyt's), to the analysis of the characteristics of the area serve as possible shortcomings of the book. Nevertheless, the general purpose of the study was fulfilled and well accomplished. Professor Griffin's book should prove to be a most welcome addition to the general academic literature on industrial location as well as to find intense use among city and state officials and others who are concerned with the subject.

MELVIN L. GREENHUT

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Social Characteristics of Urban and Rural Communities, 1950. By Otis Dudley Duncan and Albert J. Reiss, Jr. New York: John Wiley & Sons, 1956. $6.50

The Social Science Research Council is to be commended for presenting another sourcebook in the Census Monograph Series. Duncan and Reiss go beyond mere reporting of 1950 census findings. They actually develop new concepts and methods for community study, pointing out the storehouse of data available from the census yet, at the same time, those lacunae evident in conceptualization that limit analysis.

The authors test the general hypothesis that differentiation among communities in one or another basic characteristic is associated with variation in other characteristics. Dependent variables include population characteristics, socio-economic level and activities, and the distribution and movement of the population in space. Independent variables describe such morphological characteristics and indexes as community size, location with respect to dominant centers, type of functional specialization, growth and stability, and the regional context.

This volume does not utilize census tract data except in a case study of Chicago which demonstrates the difficulties of conceptualizing and analyzing rural-urban fringe materials. The census does not deal with suburbs with sufficient sophistication for community research. How is the territory within an urban area but outside the central city to be differentiated among suburb, urban fringe, rural fringe, etc.? Further research inadequacy is uncovered for persons who compare suburbs and independent cities of similar size to the neglect of socio-economic function.

The authors analyze the urbanization of rural areas by taking into account both size of urban center and distance of the community from the center. It is suggested that an urban-rural gradient may be most intensive in regions with low overall urbanization. Highly urbanized regions do not reveal as marked a gradient.

The authors challenge the usefulness of the rural-urban continum by demonstrating that size of community is perhaps more meaningful. Population characteristics tend to form a linear regression with the *logarithm* of community size.

The conceptualization and analysis of functional specialization of communities is a major contribution to typology. Duncan and Reiss use census data to classify communities by manufacture, trade, education, public administration, transportation, military, and entertainment and recreation. More than one type of specialization is permitted and complementarity of functions is recognized. By controlling community size, metropolitan location, and level of income the authors relate economic functions to their dependent variables.

The major determinants of morphological differences among communities are thus found to be community size, spatial orientation (toward an urban center), population growth, and functional specialization. These findings should be useful to social scientists and planners of various theoretical and methodological persuasions. Duncan and Reiss lay a sound foundation for research design and calls for clarification of poorly charted areas.

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Human Relations in Interracial Housing. By Wilner, Walkley, and Cook. Minneapolis: University of Minnesota Press, 1955, pp. 168, $4.00.

Although the issue of interracial housing is both important and serious, it seems to this reviewer that it is generally enshrouded by indifference or irrationality. What this facet of civil rights merits is careful attention. The authors of this book have tried, quite patently, to be scientific in their examination of the racial attitudes of people living in public, interracial housing projects in four northeastern cities.

Interviews and statistical techniques were used to cope with such questions as the following samples: (1) How do white residents, living near to or far from Negro families in the same public housing project, react to Negroes? (2) Are the resulting differences due to the fact that those who are already more favorably disposed towards Negroes tend (or happen) to be the ones who move close to Negro families? Are the less favorably disposed more likely to move out of the project when located near Negro-occupied apartments? Or, may we infer instead that these differences result from living at greater or less distances from Negro residents?

Comprehensive answers to questions of this sort can be of help in the formulation of interracial housing policies. The widespread role of public aid to non-governmental residence owners causes this reviewer to wonder how clear-cut is the distinction between "public" and "private housing." However, according to *The American City* (August 1957, p. 106) the New York, Connecticut, and Minnesota legislatures have taken steps to cover strictly private housing by fair housing bills. Some of the questions raised by non-discrimination laws dealing with multi-family housing (which we will assume are strictly private) are pursued by this study of public-housing projects. For example: What is the relation between proximity and contact? What is the influence of social pressures? What are the dimensions of attitude that undergo change?

This reviewer's guess is that this important pursuit for human relations truth would be much more meaningful if the difficulties described by the authors in making experimental comparisons under field conditions were overcome. Possibly, because of the findings of this thin volume, the opportunities for comparing segregated and non-segregated public housing projects will be greater.

In the meantime students of social science interested in this aspect of human relations and public officials owe a debt to Wilner, Walkley and Cook. In the attempt to secure precision they properly concern themselves with "factors obscuring effects of occupancy patterns." This is but one illustration of the authors' methodology. It will be helpful to future investigators.

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American Commodity Flow. By Edward L. Ullman. Seattle: University of Washington Press, 1957. pp. xxii, 215. $4.00.

Its subtitle describes this study as "a geographical interpretation of rail and water traffic based on principles of spatial interchange." State-to-state rail movements are derived from the one-percent sample of railroad waybills submitted to the Interstate Commerce Commission. The rail traffic of 20 individual states is analyzed to show in a series of maps the tonnage of each of the five major I.C.C. commodity classes (maufactures, animals and products, products of forests, of mines, and of agriculture) moving to and from each of the other 47 states. Other maps depict dry cargo and tanker movements between the five domestic port groups (North and South Atlantic, Gulf, North and South Pacific) and on the major United States foreign trade routes. Maps occupy 160 of the 205 pages of the main text, with the accompanying commentary largely devoted to a general theory of physical interaction (Chap. III) and generalizations regarding the flow patterns that emerge.

This study clearly demonstrates the value of the new tool of spatial analysis provided by the waybill sample. Professor Ullman has efficiently used available data to construct a valuable profile of the linkages that characterize the economy. However, the study suffers inherent infirmities that limit its

opportunity to reveal "distinctive spatial patterns not envisaged by *a priori* assumptions" (p. 1). Although doubtless dictated by manageability requirements, the use of the I.C.C.'s broad commodity classes embracing extremely heterogeneous clusters of raw, semi-processed, and finished goods badly blurs the linkages that define spatial relations. Supplementary information is frequently necessary to make the flow maps meaningful and to support observations that go beyond rather obvious generalizations (e.g., that manufacturing states typically have inbound tonnage balances, p. 41). Definitive analysis is also hampered by the unavailability of highway data. Rail movement constitutes an incomplete and possibly misleading measure of the flow of such commodities as animals and their products. The author generally fails to recognize this unavoidable gap in interpreting the rail flows.

Despite these limitations, Professor Ullman has provided new empirical evidence concerning spatial relations as well as a strong foundation for further building. Further stories of the spatial edifice should be erected by flow analyses which maintain greater commodity detail. And highway flow data may materialize from the new emphasis on economic research in the 1956 Federal Highway Act. With the incorporation of such refinements, Professor Ullman's contribution will be carried forward to provide further understanding of the basic principles of spatial organization.

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